Vol. 8, No. 9
May 15, 1983

Energy Research Abstracts

Abstracts 19398-22897

Technical Information Center
UNITED STATES DEPARTMENT OF ENERGY

CURRENT AWARENESS PUBLICATIONS ON ENERGY

To provide complete coverage of literature related to major Department programs, announcement publications that are comprehensive in their coverage of certain energy fields are issued regularly. All information in these publications, plus additional backup information, is included in the Energy Data Base of the Technical Information Center; all references are also available for machine searching via the on-line retrieval system, DOE/RECON, and the commercial on-line retrieval systems. Descriptions of these current awareness publications, which are supported either directly or indirectly by the DOE, appear below. Department of Energy components may receive the listed publications free from the Technical Information Center, P.O. Box 62, Oak Ridge, TN 37830. Telephone (615) 576-1303; (FTS) 626-1303.

PUBLICATIONS OF THE TECHNICAL INFORMATION CENTER

Energy Abstracts for Policy Analysis (EAPA)

A monthly abstract journal devoted to the analysis of energy research, conservation, and policy. Scope and coverage are limited to substantive articles or reports and emphasize the following: programmatic efforts; legislative, regulatory, and other legal aspects; social, economic, and environmental impacts; regional and sectoral analyses; institutional factors, etc. *EAPA* is available from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402; domestic subscribers $6.00, foreign $7.50 per copy; annual cumulative index, domestic $10.00, foreign $12.50 per copy. The annual subscription price is $70.00 for domestic subscribers and $87.50 for foreign subscribers.

Energy Research Abstracts (ERA)

A comprehensive semimonthly abstract journal devoted to all areas of energy-related information produced by the Department of Energy, other U. S. government organizations, and foreign governments. *ERA* is available to the public on a subscription basis from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. The subscription rate for the 24 semimonthly issues is $165.00 for domestic subscribers and $206.25 for foreign subscribers. A single issue costs $9.50 (domestic) or $11.90 (foreign).

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Fusion Energy Update (CFU)

A monthly abstract journal devoted to information on controlled thermonuclear research. Available as PB83-915300.

Solar Energy Update (SEU)

A monthly abstract journal devoted to information on the utilization of solar energy, including biomass and tidal and wind power. Available as PB83-914500.

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Nuclear Reactor Safety (NRS)

A semimonthly current awareness bulletin covering the following safety aspects: accident analysis, safety systems, radiation protection, decommissioning and dismantling, and security measures. Available as PB83-913500.

Radioactive Waste Management (RWM)

A semimonthly current awareness bulletin covering the following management aspects: transport and storage, waste processing, waste disposal, waste storage, radioactive effluents, and shipping containers. Available as PB83-902900.

INTERNATIONAL ENERGY PUBLICATIONS

The Technical Information Center cooperates with the following organizations in the publication of international abstract journals: (1) International Atomic Energy Agency, International Nuclear Information System, Vienna, Austria, for *Atomindex;* (2) International Energy Agency, IEA Coal Research, London, England, for *Coal Abstracts;* and (3) International Energy Agency, Biomass Conversion Technical Information Service, Dublin, Ireland, for *Biomass Abstracts.* In each case, the cognizant foreign agency provides the non-U.S. information to TIC for inclusion in the Energy Data Base; in turn, TIC provides the U.S. information for input into the respective journal.

Atomindex

A semimonthly abstract journal providing worldwide coverage of information on nuclear science and technology. *Atomindex* is available by subscription from UNIPUB, 345 Park Avenue South, New York, NY 10010. The cost of an annual subscription, 24 semimonthly issues and semiannual and annual cumulative indexes, is $290.

Biomass Abstracts

A bimonthly abstract journal with comprehensive coverage of information in any step involved in the eventual conversion of biomass to energy. *Biomass Abstracts* is available free to Department of Energy components and contractors from the Technical Information Center. Non-DOE organizations may obtain *Biomass Abstracts* from Biomass Conversion Technical Information Service, Institute for Industrial Research and Standards, Ballymun Road, Dublin 9, Ireland, for 42 IR pounds per year. Make checks payable to the Institute.

Coal Abstracts

A monthly abstract journal providing comprehensive worldwide coverage of information in the field of coal science and technology. *Coal Abstracts* is available to Department of Energy components and contractors from the Technical Information Center. Non-DOE organizations may obtain *Coal Abstracts* from IEA Coal Research, Technical Information Service, 14-15 Lower Grosvenor Place, London SW1W 0EX, England, for 100 pounds sterling per year.

energinfo ERA

Vol. 8, No. 9
ISSN: 0160-3604
CODEN: ERABD
May 15, 1983

ENERGY RESEARCH ABSTRACTS

ABOUT THE TECHNICAL INFORMATION CENTER

The Technical Information Center in Oak Ridge, Tennessee, has been the national center for scientific and technical information for the Department of Energy (DOE) and its predecessor agencies since 1946. In developing and managing DOE's technical information program, the Center places under bibliographic control not only DOE-originated information but also worldwide literature on scientific and technical advances in the energy field and announces the source and availability of this information. Whereas the literature of science is emphasized, coverage is extended to DOE programmatic, socioeconomic, environmental, legislative/regulatory energy analysis, and policy-related areas. To accomplish this mission, the Center builds and maintains computerized energy-information data bases and disseminates this information via computerized retrieval systems and announcement publications such as abstracting journals, bibliographies, and update journals. Direct access to the Center's most comprehensive data base, the Energy Data Base, is available to the public through commercial on-line bibliographic retrieval systems. The Energy Data Base and many of the Center's energy-related data bases are available to DOE offices and contractors and to other government agencies via DOE/RECON, the Department's on-line information retrieval system. The Center has developed and maintains systems to record and communicate energy-related research-in-progress information, to catalog official DOE issue-and-policy documents, to maintain a register of DOE public communications publications, to track research report deliverables from DOE contractors, and to test and make available DOE-funded computer software programs with scientific and management applications. The Center also maintains a full-scale publishing capability to serve special publication needs of the Department. To effectively manage DOE's technical information resources, the Center's program is one of continual development and evaluation of new information products, systems, and technologies.

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Energy Research Abstracts (ERA) provides abstracting and indexing coverage of all scientific and technical reports, journal articles, conference papers and proceedings, books, patents, theses, and monographs originated by the U. S. Department of Energy, its laboratories, energy centers and contractors. *ERA* also covers other energy information prepared *in report form* by federal and state government organizations, foreign governments, and domestic and foreign universities and research organizations. The user should remain aware that *ERA* coverage of non-report literature is limited to that generated by Department of Energy activity.

ERA is comprehensive in its subject scope, encompassing the DOE's research, development, demonstration, and technological programs resulting from its broad charter for energy sources, supplies, safety, environmental impacts, and regulation.

ERA is available on an exchange basis to universities, research institutions, industrial firms, and publishers of scientific information. Inquiries should be directed to the Technical Information Center, P. O. Box 62, Oak Ridge, Tennessee 37830.

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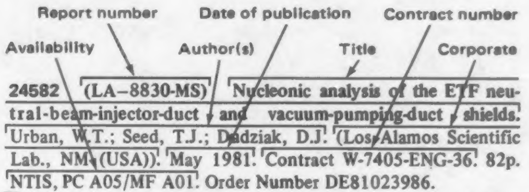
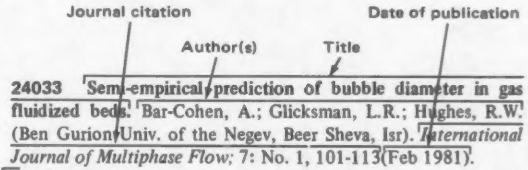
The principal elements of abstract entries for a typical research and development report and a typical technical journal article are illustrated below.



24582 (LA–8830-MS) **Nucleonic analysis of the ETF neutral-beam-injector-duct and vacuum-pumping-duct shields.** Urban, W.T.; Seed, T.J.; Dudziak, D.J. (Los Alamos Scientific Lab., NM (USA)). May 1981. Contract W-7405-ENG-36. 82p. NTIS, PC A05/MF A01. Order Number DE81023986.

Abstract

A nucleonic analysis of the Engineering Test Facility neutral-beam-injector-duct and vacuum-pumping-duct shields has been made using a hybrid Monte Carlo/discrete-ordinates method. This method used Monte Carlo to determine internal and external boundary surface sources for subsequent discrete-ordinates calculations of the neutron and gamma-ray transport through the shields. Confidence was provided in both the hybrid method and the results obtained through a comparison with three-dimensional Monte Carlo results.



24033 **Semi-empirical prediction of bubble diameter in gas fluidized beds.** Bar-Cohen, A.; Glicksman, L.R.; Hughes, R.W. (Ben Gurion Univ. of the Negev, Beer Sheva, Isr). *International Journal of Multiphase Flow;* 7: No. 1, 101-113(Feb 1981).

Abstract

Theoretical expressions for bubble diameter in both small and large particle fluidized beds are derived by the application of two phase theory and gas flow continuity. Comparison with experimental data suggests that the numerical and analytical solution of these expressions, combined with empirical bubble frequency relations, can provide an accurate prediction of bubble size and its parametric trends. 25 refs.

INDEXES TO *ENERGY RESEARCH ABSTRACTS*

Five indexes are provided for approaching the contents of each issue of *Energy Research Abstracts (ERA).* Each index is preceded by an introduction that details the organization of the index and the principles by which it was compiled. The reader is referred to these introductions for information not found in the index examples that follow.

• Corporate Author Index

Technical report literature is indexed using the name of the organization or institution responsible for the issuance of the report.

24582 (LA–8830-MS) Nucleonic analysis of the ETF neutral-beam-injector-duct and vacuum-pumping-duct shields. Urban, W.T.; Seed, T.J.; Dudziak, D.J. **(Los Alamos Scientific Lab., NM (USA)).** May 1981. Contract W-7405-ENG-36. 82p. NTIS, PC A05/MF A01. Order Number DE81023986.

is indexed as:

Los Alamos Scientific Lab., NM (USA)
Nucleonic analysis of the ETF neutral-beam-injector-duct and vacuum-pumping-duct shields, 6:24582 (R:US)

• Personal Author Index

Each author's name is indexed in the form appearing on the document abstracted, with the exception that given names are reduced to initials:

Bar-Cohen, A., Semi-empirical prediction of bubble diameter in gas fluidized beds, 7:24033 (J:US)
Dudziak, D.J., *See* Urban, W.T., 6:24582
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Seed, T.J., *See* Urban, W.T., 6:24582
Urban, W.T., Nucleonic analysis of the ETF neutral-beam-injector-duct and vacuum-pumping-duct shields, 6:24582 (R:US)

• Subject Index

The subject index consisting of entries naming specific materials, objects, and processes is arranged alphabetically. Document titles, informative phrases, or both specific to these entries are arranged alphabetically under the entries.

TOKAMAK ETF
Neutral Atom Beam Injection
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• Contract Number Index

DOE technical literature is indexed using contract numbers under which the literature was produced. This index contains the contract number with corresponding abstract and report numbers.

W-7405-ENG-36	**Los Alamos National Lab., NM (USA)**	
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• Report Number Index

Technical report literature is also indexed using report numbers. This index includes information on where individual reports may be obtained. Patents and conference papers are indexed here as a matter of convenience. When a report is supplied under an Order Number, that number is included in the availability statement. An Order Number–Report Number Correlation is included for convenience.

LA–8830-MS	6:24582	NTIS, PC A05/MF A01. Order Number DE81023986, Distribution Category STD-20d

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SUBJECT CONTENTS (NUMERICAL LISTING)

Six-digit subject category numbers are used in the storage, retrieval, and manipulation of bibliographic information entered into DOE's computerized bibliographic information system. The six-digit category numbers are utilized as if they were three pairs of two-digit numbers, the first two pairs being used to arrange the abstract content of *Energy Research Abstracts.* The following listing includes the totality of the 40 first-level and 294 second-level subject categories used. Because each issue of *ERA* announces only those documents becoming available during a semimonthly period, some subject categories may not be represented in every issue. The complete subject category scheme with scope notes is available as DOE/TIC-4584-R4 from NTIS for $7.00.

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Six-digit subject category numbers are used in the storage, retrieval, and manipulation of bibliographic information entered into DOE's computerized bibliographic information system. The six-digit category numbers are utilized as if they were three pairs of two-digit numbers, the first two pairs being used to arrange the abstract content of *Energy Research Abstracts*. The following listing includes the totality of the 40 first-level and 294 second-level subject categories used. Because each issue of *ERA* announces only those documents becoming available during a semimonthly period, some subject categories may not be represented in every issue. The complete subject category scheme with scope notes is available as DOE/TIC-4584-R4 from NTIS for $7.00.

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ENERGY RESEARCH ABSTRACTS

01 COAL AND COAL PRODUCTS

19398 (DOE/EIA—0064(82)) **Coal data: a reference.** Slatick, E.R. (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Oct 1982. 74p. NTIS, PC A04/MF A01. Order Number DE83008013.

This document contains a summary of information and data about the coal industry in the United States. Separate sections are provided for descriptions of coal deposits, resources and reserves, production and mining, preparation, transport and handling, tracing the history of coal, supply, consumption, coal and coke trade, and new ways to use coal. It also contains numerical data on the above topics and a section on coal terminology and related information, statistical data, illustrations, maps, and photographs. Selected references and sources of information are listed for the reader interested in going beyond the scope of this report. (DMC)

19399 **(DOE/FE/60138—T1) Final report for technical, scientific, engineering support to the Office of Fossil Energy.** (Pyros, Inc., Gaithersburg, MD (USA)). Oct 1982. Contract AC01-82FE60138. 19p. NTIS, PC A02/MF A01. Order Number DE83008562.

Various support work in planning and evaluating certain fossil energy research programs and determining priorities and goals are discussed briefly. The major effort seems to have been a study of Future World Oil Prices: Review of Current Forecasts, Identification of Price-determining Factors and Delineation of a Quantitative Framework for Analysis (DOE/FE/60138—T2), September 16, 1982. Most of the rest of this work appears to have been regarded as internal and was not distributed further. (LTN)

0104 Processing

REFER ALSO TO CITATION(S) 19544, 19546, 19547, 19549, 19550, 19551, 19552, 19558, 19559, 19560, 19562, 19564, 19564, 19565, 19568, 19572, 19577, 19577, 19579, 19580, 19581, 19596, 19601, 19620, 19636, 19671, 19933, 19949, 20395, 20883, 21088, 21088, 21124, 21250, 21251, 21256, 21301, 21422

19400 **(ACIRL-PR—82-2) Design and commissioning of a 2 to 5 kg/h continuous reactor unit (CRU Mark II).** Bennett, P.A. (Australian Coal Industry Research Labs. Ltd., North Ryde). Jan 1982. 36p. Australian Coal Industry Research Labs. Ltd., North Ryde.

The design and commissioning of an upgraded continuous reactor (CRU Mark II) for studying the hydroliquefaction of coal is described. The reactor can be operated under a wider range of process conditions than the CRU Mark I. The improvements made to the CRU Mark II are outlined. These improvements enable both SRC and new German processes to be studied. (10 refs.)

19401 **(CONF-800878—) Seventh annual international conference on coal gasification, liquefaction, and conversion to electricity.** Brainard, A.J. (ed.). (Pittsburgh Univ., PA (USA). Dept. of Chemical and Petroleum Engineering). 1980. 518p. Univ. of Pittsburgh, Dept. of Chemical and Petroleum Engineering, Pittsburgh, PA 15261.

From 7. annual international conference on coal gasification, liquefaction, and conversion to electricity; Pittsburgh, PA, USA (5 Aug 1980).

The seventh annual international conference on coal gasification, liquefaction, and conversion to electricity was held August 5-7, 1980, at the Department of Chemical and Petroleum Engineering, University of Pittsburgh, Pennsylvania. Twenty-five papers have been entered individually into EDB and ERA. Two papers had been enered previously from other sources. (LTN)

19402 (CONF-800878—, pp 39-56) **Governmental and industrial measurements in the fields of coal gasification and coal liquefaction in the Federal Republic of Germany.** Duecker, R. (Ruhrkohle Oel Und Gas Gmbh, Essen, Germany). 1980. Univ. of Pittsburgh, Dept. of Chemical and Petroleum Engineering, Pittsburgh, PA 15261.

From 7. annual international conference on coal gasification, liquefaction, and conversion to electricity; Pittsburgh, PA, USA (5 Aug 1980).

This brief survey of the German Coal Conversion Program issued by the federal government in January 1980, indicates to what extent the further improvement of new coal gasification and liquefaction technologies has to be supported. In the course of the past two energy programs 1974-1980, the federal government has already contributed funds up to about 800 m US$ for the general development of coal extraction and conversion technologies. More than 90% of these funds were from industry which in return contributes with remarkable funds of its own, the average of the industrial contribution in the field of coal research amounting to about 40% of the total cost so that the overall sum for these projects amount to approximately 2 b US$. Adding the contribution of the state governments of Northrhine-Westphalia and Saarland, the sum for the general coal research program amounts to more than 2.3 b US$ for 1974 until today. These are enourmous efforts for an area of production in which only 1% of all West German employees are engaged; contributing about 1% of the German gross national product. In view of today's worldwide energy situation and recent political developments in some of the OPEC countries, these governmental efforts have already been justified and necessary in order to ensure a long term flexible supply of energy in the Federal Republic of Germany.

19403 (CONF-800878—, pp 57-80) **Exxon donor solvent coal liquefaction process: development program status.** Epperly, W.R.; Plumlee, K.W.; Wade, D.T. (Exxon Research and Engineering Co., Florham Park, NJ). 1980. Univ. of Pittsburgh, Dept. of Chemical and Petroleum Engineering, Pittsburgh, PA 15261.

From 7. annual international conference on coal gasification, liquefaction, and conversion to electricity; Pittsburgh, PA, USA (5 Aug 1980).

The status of the Exxon Donor Solvent Coal Liquefaction Process Development Program is reviewed. Included in the overview of this government-industry cost-shared development is a description of Exxon's integrated approach to the project. The status of the laboratory and engineering research and development studies, along with an up-to-date status of the 250 T/D large pilot plant demonstration, are presented. The process description includes discussions of coal feed flexibility and product flexibility. Potential product utilization schemes, including direct utilization and various conventional upgrading routes, are surveyed. The project environmental program philosophy and studies are described. The economic outlook for the EDS process and the effects of various bases is presented, concluding with consideration of the prospects for commercialization.

19404 (CONF-800878—, pp 81-99) **Current status of H-Coal commercialization.** Stotler, H.H.; MacArthur, J.B.; Comolli, A.G. (Hydrocarbon Research, Inc., Lawrenceville, NJ). 1980. Univ. of Pittsburgh, Dept. of Chemical and Petroleum Engineering, Pittsburgh, PA 15261.

From 7. annual international conference on coal gasification, liquefaction, and conversion to electricity; Pittsburgh, PA, USA (5 Aug 1980).

H-Coal is a direct catalytic hydroliquefacion process for converting coal into high quality, clean liquids. The process uses the commercially proven ebullating-bed reactor to achieve superior distillate yields in the range of 40 to 50 weight percent from a wide variety of coals. Having been thoroughly and successfully tested in laboratory equipment at coal capacities up to 3.5 tons per day, H-Coal is now being demonstrated in commercial-size equipment at the 600 ton-per-day pilot plant in Catlettsburg, Kentucky. Design of a commercial H-Coal plant has been initiated under sponsorship of the Department of Energy. A comparative economic study of several coal liquefaction processes prepared for the US Department of Energy suggests that the H-Coal syncrude mode operation is a front-runner in terms of lowest product cost.

19405 (CONF-800878—, pp 100-110) **Sasol: tons to barrels, now.** Samuel, W.A. (Fluor Engineers and Constructors, Inc., Irvine, CA). 1980. Univ. of Pittsburgh, Dept. of Chemical and Petroleum Engineering, Pittsburgh, PA 15261.

From 7. annual international conference on coal gasification, liquefaction, and conversion to electricity; Pittsburgh, PA, USA (5 Aug 1980).

Each plant (Sasol II and Sasol III) is designed to process about 40,000 tons of coal per day. A simplified flow sheet entitled Sasol Synthol Process illustrates the overall process scheme for both Sasol Two and Sasol Three. In the following section we discuss each of these units in some detail. The following is a general description. Coal passes from the mine to the coal preparation units and then to the power stations and to the Lurgi gasification system. Air enters the air separation system to supply the oxygen which passes to the Lurgi apparatus along with most of the steam from the power station. In the gasifiers, the reactions occur to produce a raw gas which includes tars and some aqueous chemicals. These are separated in the quench system, with the tars going to further refining and the aqueous gas liquor going to units to recover those chemicals. The raw gas proceeds to a Lurgi Rectisol system for removal of the acid gas constituents to produce a pure gas suitable for Fischer-Tropsch reaction. This material goes to the Synthol fluid bed system along with hydrogen and carbon monoxide produced by reforming the methane produced in the gasification reactor. The reaction products from the Synthol system go to a product recovery unit from which the ethylene is separated as a salable chemical. The methane goes to the methane reforming unit, and the other products are sent to a product refinery from which are produced the LPG, gasoline, diesel, fuel oil, jet fuel, and other chemicals as noted on the flow sheet.

19406 (CONF-800878—, pp 111-129) **Comparison of different Fischer-Tropsch processes.** Deckwer, W.D. (Univ. of Hannover, West Germany). 1980. Univ. of Pittsburgh, Dept. of Chemical and Petroleum Engineering, Pittsburgh, PA 15261.

From 7. annual international conference on coal gasification, liquefaction, and conversion to electricity; Pittsburgh, PA, USA (5 Aug 1980).

Various FT processes have been proposed and either used commercially or tested extensively. They differ particularly on the type of reactor and the kind of heat removal. It is the reactor and its operational conditions which determine the product distribution and the upgrading scheme. At first, one can roughly distinguish between FT processes with stationary and mobile catalyst phase. Among the various fixed bed processes it is only the ARGE reactor which meets the present standards of fixed bed reactor technology and offers high performance and production capacities. Reactors with mobile catalysts are fluidized beds (Hydrocarbon Research Inc.), entrained fluidized beds (Sasol, Kellogg), the three-phase slurry reactor (Rheinpreussen-Koppers), and the three-phase fluidized bed and fixed bed reactors with oil circulation (BASF, Bureau of Mines). The ARGE process and the entrained bed reactor, which both are commercialized by Sasol, are treated briefly. Though these two processes work successfully and profitably this must not necessarily imply that they are optimal choices under all circumstances. Other technologies may prove viable too, and, possibly, may be better suited under certain conditions to produce synthetic fuels. In particular, three-phase reactor technology has experienced a fast development, and the aspects to carry out the FT synthesis in 3-phase reactors appear very promising. Therefore, the Rheinpreussen-Koppers slurry process and the oil circulation processes of the Bureau of Mines are considered and briefly characterized.

19407 (CONF-800878—, pp 130-152) **Demonstration and commercialization of the SRC-I technology.** Tao, J.C.; Bixler, A.D.; Breyne, E.J. (International Coal Refining Co., Allentown, PA). 1980. Univ. of Pittsburgh, Dept. of Chemical and Petroleum Engineering, Pittsburgh, PA 15261. Contract AC05-78OR03054.

From 7. annual international conference on coal gasification, liquefaction, and conversion to electricity; Pittsburgh, PA, USA (5 Aug 1980).

The Solvent Refined Coal (SRC-I) Process, one of the most advanced direct coal liquefaction processes available, has attracted national attention because (1) it is a partial answer to the energy crisis and (2) it is an answer that is about to be implemented. A 6000 tons per day SRC-I Demonstration Plant is now being designed and will be constructed and operated by the International Coal Refining Company (ICRC) - partnership of Air Products and Chemicals, Inc., and Wheelabrator-Frye Inc. - under contract to the Department of Energy (DOE). The project, which is already in the detailed engineering phase, has scheduled operations at the Demonstration Plant, in Newman, KY, to begin by late 1984. Expansion to commercial product, 30,000 TPD, is planned for 1990. This paper discusses the selection of major technologies for both the Demonstration Plant and the Commerical Plant. For the Demonstration Plant it presents the analyses that governed the selection of technologies for four processing steps: deashing, gasification of the mineral ash residue to produce hydrogen, product cooling or solidification of the SRC, and expanded-bed hydrocracking to convert the SRC to liquid fuels. For the Commercial Plant it discusses the overall design of that expanded operation, the projected product slate, product costs - comparing SRC costs with projected oil prices for the next decade when the Commercial Plant will be operating - financing assumptions, and schedule.

19408 (CONF-800878—, pp 153-163) **Coal-based ammonia and methanol manufacture using Koppers-Totzek gasification.** Engelbrecht, A.D.; Partridge, L.F. (AECI Ltd., Modderfontein, South Africa). 1980. Univ. of Pittsburgh, Dept. of Chemical and Petroleum Engineering, Pittsburgh, PA 15261.

From 7. annual international conference on coal gasification, liquefaction, and conversion to electricity; Pittsburgh, PA, USA (5 Aug 1980).

A coal-based ammonia and methanol plant, using Koppers-Totzek gasification, has been operated for over 5 years by AECI Limited in Modderfontein, South Africa. Capacity of the plant is 1000 metric tons/day of combined ammonia and methanol, and the plant forms part of a chemical complex producing nitrogen fertilizers and explosives. This paper provides a description of the process and briefly reviews the experience we have had in operating a modern coal-based ammonia and methanol plant. The Koppers-Totzek gasification process is described in some detail since the objective of this conference session is primarily to present operating experience with existing commercialized coal gasification technology. A subject which is receiving considerable attention at this time in relation to coal conversion processes is environmental impacts, and this topic is considered in relation to the Koppers-Totzek based plant at Modderfontein. In the light of AECI experience the Koppers-Totzek gasification process offers distinct advantages for production of synthesis gas from coal, for applications such as ammonia and methanol manufacture. Production of a clean raw gas with no byproducts (hydrocarbons, aromatics or phenols) and minimal environmental impact make it a suitable process for integration into a chemicals manufacturing complex such as Modderfontein. Although initially plant reliability was poor, availability has continually improved and considering the complexity of a coal-based plant such as this when compared to gas or oil-based plants, the availability currently achieved is highly gratifying. As a fully commercialized process, Koppers-Totzek gasification must be considered as a candidate for production of synthesis gas from coal for projects under evaluation over the next 5 to 10 years.

19409 (CONF-800878—, pp 164-179) **Operating experience gained with the PKM/GSP coal fixed bed pressure gasification process.** Schutter, W. (Industrieanlagen, Import, Berlin, East Germany); Genauck, P. 1980. Univ. of Pittsburgh, Dept. of Chemical and Petroleum Engineering, Pittsburgh, PA 15261.

From 7. annual international conference on coal gasification, liquefaction, and conversion to electricity; Pittsburgh, PA, USA (5 Aug 1980).

Essentially, the economical results achieved are dependent on construction details and on the overall operating principle of a plant. In this respect, a great number of measures to improve gasifier operation have already proved successful. In this connection, reference may be made to some concepts covered in other publications. Fully automatic charging system using the concept of electrohydraulic control and filling level indication by means of radioactive isotopes; centralized hydraulic system for operating the coal and ash lock hoppers as well as the drive elements of the rotary grates; use of a fire-resistant hydraulic fluid; a combination of process instrumentation and control equipment in a control centre for a reliable performance of all equipment for operation and safety monitoring; open-air structures superior to structural arrangements used so far in pressure gasworks; concepts for dust removal using Venturi scrubbers incorporated in arrangement of gasifier - scrubber cooler-waste heat broiler - raw gas purification; processing of gas liquors containing dust subsequent to their expansion in large tanks; control of corrosion of the inner shell of lined gasifiers by using cladded materials; reduction of wear in piping and elements particularly susceptible to wear; and improvement of the drive elements and supports of rotary grates.

19410 (CONF-800878—, pp 180-199) **Development of the Shell-Koppers coal gasification process.** Vogt, E.V.; Weller, P.J. (Shell Internationale Petroleum Maatschappij B.V., The Hague, Netherlands). 1980. Univ. of Pittsburgh, Dept. of Chemical and Petroleum Engineering, Pittsburgh, PA 15261.

From 7. annual international conference on coal gasification, liquefaction, and conversion to electricity; Pittsburgh, PA, USA (5 Aug 1980).

The Shell-Koppers process for the gasification of coal under pressure, based on the principles of entrained bed technology, is characterized by: practically complete gasification of virtually all solid fuels; production of a clean gas without byproducts; high throughput; high thermal efficiency and efficient heat recovery; and environmental acceptability. There are numerous possible future applications for this process. The gas produced (93 to 98% vol. hydrogen and carbon monoxide) is suitable for the manufacture of hydrogen or reducing gas and, with further processing substitute natural gas (SNG). Moreover, the gas can be used for the synthesis of ammonia, methanol and liquid hydrocarbons. Another possible application of this process is as an integral part of a combined-cycle power station featuring both gas and steam turbines. The integration of a Shell-Koppers coal gasifier with a combined-cycle power station will allow electricity generation at 42 to 45% efficiency for a wide range of feed coals. The development programme includes the operation of a 150 t/d gasifier at Deutsche Shell's Harburg refinery since November 1978 and of a 6 t/d pilot plant at Royal Dutch Shell's Amsterdam laboratories from December 1976 onwards. Both facilities run very successfully. With hard coal a conversion of 99% is reached whilst producing a gas with only 1% vol. CO_2. The next step will be the construction and operation of one or two 1000 t/d prototype plants which are scheduled for commissioning in 1984/85. Towards the end of the eighties large commercial units with a capacity of 2500 t/d are contemplated. The economics, especially of these large-size units, is very competitive.

19411 (CONF-800878—, pp 217-232) **Winkler fluid bed coal gasification experience with low grade coals.** Boegner, F. (Davy International AG, Cologne, West Germany); Kendron, T.J.; Subramanian, T.K. 1980. Univ. of Pittsburgh, Dept. of Chemical and Petroleum Engineering, Pittsburgh, PA 15261.

From 7. annual international conference on coal gasification, liquefaction, and conversion to electricity; Pittsburgh, PA, USA (5 Aug 1980).

One of the proven commercial systems in the gasification of carbonaceous material is the Winkler fluid bed process. This process has been commercially used in the production of: low and medium Btu industrial gas; synthesis gas for ammonia, methanol and oxo-alcohols; Fischer-Tropsch synthesis gas; reducing gas; and hydrogen. The Winkler fluid bed process is well suited for more reactive, young carbonaceous materials like peat, lignite and subbituminous coals which are available in abundance around the world. Low grade coals with a high percentage of fines in the range of 0 to 3/8-inch, high ash content up to 50%, and high sulfur content have been successfully gasified in the commercial Winkler gasifiers. These gasifiers have performed with high efficiency, especially when the ash fusion temperature is in the range of 2000 to 3000°F as found in the majority of US coals. For commercial plants it should be remembered that, though the economy of total production depends upon gasification efficiency which varies from process to process only in a small range, it is very important to have high performance and reliability in the gasification process and related equipment. The paper describes how the Winkler fluid bed gasification has been improved and simplified in both operation and maintenance for commercial plants.

19412 (CONF-800878—, pp 304-334) **Coal Gasifier Cogeneration Power Plant Project.** Bloomfield, H.S. (NASA, Lewis Research Center, Cleveland, OH). 1980. Univ. of Pittsburgh, Dept. of Chemical and Petroleum Engineering, Pittsburgh, PA 15261.

From 7. annual international conference on coal gasification, liquefaction, and conversion to electricity; Pittsburgh, PA, USA (5 Aug 1980).

A unique power plant comprised primarily of commercially available equipment and using high sulfur coal in an environmentally acceptable manner is currently under study by NASA for installation at its Lewis Research Center (LeRC), Cleveland, Ohio, facility to supply total steam requirements together with a major portion of its electrical load. The plant size will be appropriate to industrial, or small utility, integrated gasifier combined cycle applications. The facility is of high modular design that will provide both process heat and electricity at high efficiency. This paper gives a good description of the engineering considerations and technical feasibility; the project is not yet complete so the economics may still be in question. (LTN)

19413 (CONF-800878—, pp 335-351) **Commercialization of coal gasification in the US: Great Plains Gasification Associates.** Boulanger, R.E. (American Natural Service Co., Detroit, MI). 1980. Univ. of Pittsburgh, Dept. of Chemical and Petroleum Engineering, Pittsburgh, PA 15261.

From 7. annual international conference on coal gasification, liquefaction, and conversion to electricity; Pittsburgh, PA, USA (5 Aug 1980).

The Great Plains coal gasification project is, as the title implies, a project designed to convert coal into synthetic natural gas. The plant is designed to produce an average of 125 million cubic feet per day of high-Btu, pipeline quality synthetic gas from North Dakota lignite coal. The plant would be located at the mine site in North Dakota, use water from the Missouri River and produce gas that is completely interchangeable with natural gas. The five companies that are partners in the project are affiliates of companies which supply approximately one-third of the interstate natural gas used in this country, in turn natural gas represents approximately 30% of our nation's energy requirement. The total cost of the project is expected to be about $1.5 billion including the mine, but excluding capital costs during construction and any required new pipeline facilities. Approximately $1.2 billion of the project costs would be debt and the remainder equity. The principle parties to the project are identified in Exhibit I. The size of the project, its unique nature, the regulatory interplay, all contributed issues which required careful consideration and negotiation in developing a financing plan.

19414 (CONF-800878—, pp 352-362) **Conoco's program for production of methanol from coal.** Bowden, J.R. (Conoco Coal Development Co., Stamford, CT). 1980. Univ. of Pittsburgh, Dept. of Chemical and Petroleum Engineering, Pittsburgh, PA 15261.

From 7. annual international conference on coal gasification, liquefaction, and conversion to electricity; Pittsburgh, PA, USA (5 Aug 1980).

Conoco's commercial program is based on four premises. First, we believe Conoco's principal interest and main profit potential lies in liquid fuels; so we propose that Conoco take only the methanol from co-production (fuel gas and methanol) plants and sell, or upgrade and sell, methanol in our own channels. Second, we believe there are significant profit opportunities in an efficient manufacturing and distribution network throughout the United States; so we see the full development of this concept requiring multiple plant locations sited across the country. Third, the capital requirements for multiple plants are enormous; so we foresee, at least for the first few plants, joint venture arrangements with partners whose primary interests are in the gas produced in these plants. Fourth, although present technology clearly favors co-production, technology probably will develop which will enable us to construct wholly-owned methanol-only plants, thus, simplifying our business relationships. The prime target market for our methanol production is the power generating utility market. Here methanol has been demonstrated, in a joint EPRI-Southern California Edison Test Program, to be a fuel superior to either gas or distillate fuel for use in stationary gas turbines. At first, transportation uses will represent a secondary market for methanol, although we expect ultimately this will be the primary market.

19415 (CONF-800878—, pp 363-374) **Status of the Cool Water Coal Gasification Program.** Papay, L.T. (Southern California Edison Co., Rosemead, CA). 1980. Univ. of Pittsburgh, Dept. of Chemical and Petroleum Engineering, Pittsburgh, PA 15261.

From 7. annual international conference on coal gasification, liquefaction, and conversion to electricity; Pittsburgh, PA, USA (5 Aug 1980).

The Southern California Edison Company and Texaco Inc., announced formation of the Cool Water Coal Gasification Program on July 31, 1979. The Program is designed to demonstrate technical and economic feasibility of the Texaco Coal Gasification Process, one of the leading processes for producing a clean synthetic fuel from coal. This proposed joint venture has a capital cost estimate of approximately $300 million. It involves the design, construction and demonstration of an integrated 100 megawatt coal gasification/combined-cycle electric generating facility on the commercial scale of 1000 tons per day coal feed rate. In addition to advancing the state-of-the-art, the Cool Water Program has unique features in its arrangements for program funding. Both technical and financial participation is being sought from a variety of industrial organizations which have the collective ability to commercially transfer proven hardware from the demonstration program to the competitive marketplace. Also, Program Participants have the opportunity to receive full recovery of their contributed funds by means of a fuel processing fee based on the actual amount of synthesis gas produced by the facility. To date, approximately one-half of required funding has been identified. Efforts are continuing to obtain additional commitments from other prospective parties. California environmental permits are in place, engineering design work has commenced, and testing of the plant is expected to begin about the end of 1983. This Program is expected to be a successful step toward eventual commercialization of large-scale coal conversion technology to supply fuel to future combined-cycle plants, a fuel to existing boilers, and a possible fuel for other advanced energy systems such as fuel cells.

19416 (CONF-800878—, pp 375-393) **Aspects of commercial medium Btu coal gasification.** Wellborn, S.G. (E.I. du Pont de Nemours and Co., Inc., Wilmington, DE). 1980. Univ. of Pittsburgh, Dept. of Chemical and Petroleum Engineering, Pittsburgh, PA 15261.

From 7. annual international conference on coal gasification, liquefaction, and conversion to electricity; Pittsburgh, PA, USA (5 Aug 1980).

Combustion characteristics and thermal efficiency make MBG gas a lowest cost alternative. MBG has environmental advantages over most other synfuels and the direct combustion of coal. For those who use hydrogen and carbon monoxide, it has excellent feedstock characteristics. The commercial concept we see as most attractive is where a large scale gasification plant pipelines the product to a concentrated industrial area for consumption by multiple users. To fully achieve the economy of scale inherent in coal conversion processes, a very large facility is required. The energy output here is roughly 50,000 B/DoE. The coal supply requires large mines. Investment and operating costs exceed the assets of many responsible companies in the United States, as you well know. This is largely due to the extended chain of elements required to make up a viable commercial venture. It is the integration of this sequence of elements, each one of which is a major project in its own right by normal standards, that is a major aspect of a commercialization effort. A number of different types of industries and capabilities are needed to build such a chain and deal wih the scale of the undertaking. The appropriateness of a joint venture approach seems obvious. The talents of the mining industry, transportation industry - both for the coal and the product gas pipelining, an industry for gasification and, of course, the consumption by user industries and utilities must be melded together for success. A very important aspect of the melding is participant characteristics.

19417 (CONF-800878—, pp 394-398) **Role of coal gasification in the future supply and demand for gas energy in the US.** Schlesinger, B.; German, M.I. (American Gas Association, Arlington, VA). 1980. Univ. of Pittsburgh, Dept. of Chemical and Petroleum Engineering, Pittsburgh, PA 15261.

From 7. annual international conference on coal gasification, liquefaction, and conversion to electricity; Pittsburgh, PA, USA (5 Aug 1980).

Synthetic gas from coal can begin to make a modest contribution to US gas supplies during the 1980's, potentially rising to the equivalent of 300,000 barrels per day of oil or more by 1990. The first several US commercial synthetic coal gas plants are proposed for Western US locations and will utilize the Lurgi process followed by a methanation step. Following successful demonstrations at full commercial scale during the 1980's synthetic coal gasification at a potpourri of US locations, and using a variety of coal and technologies, can combine to produce far greater quantities of synthetic pipeline gas, potentially contributing 3.6 Tcf (about 1.6 million barrels/day oil equivalent) to US gas supplies by the year 2000. The gas produced from high-Btu coal gasification plants built over the next five years will be a competitive fuel for residential, commercial and industrial consumers. Product cost estimates made by project sponsors indicate coal gas will be competitive with foreign oil and unconventional natural gas. Plants projected to come on line in the mid-1980's have forecast product prices competitive with pipeline supplies in the first year of operation. Given successful resolution of the Great Plains Coal Gasification project tariff in court, the principal regulatory constraint to commercialization of coal gasification technology will shift from the economic, technical and regulatory barriers faced by individual projects to general marketing constraints on gas.

19418 (CONF-800878—, pp 399-430) **Real cost of synthetic fuels.** Louks, B.M.; Gluckman, M.J. 1980. Univ. of Pittsburgh, Dept. of Chemical and Petroleum Engineering, Pittsburgh, PA 15261.

From 7. annual international conference on coal gasification, liquefaction, and conversion to electricity; Pittsburgh, PA, USA (5 Aug 1980).

The major purpose of this paper is to bring forth the real cost of an almost forgotten synfuel - intermediate-Btu gas. Our experience is that a large fraction of the energy community limits its thinking almost exclusively to SNG when they are called on to deliberate about coal gasification. Results of EPRI studies of the costs of intermediate-Btu gas, which we think will be more useful, will be presented. The results should be useful to those who need more complete knowledge of coal gasification products. Costs of intermediate-Btu gas will be presented in mid-1979 dollars. This may not be acceptable to those who believe future inflation needs to be included in cost analyses. Accordingly, another purpose of this paper is to present an engineering economics methodology which permits the estimator to forget about using inflation. Its use has never really been required, and it is hoped that this paper will convince the synfuel community that this is true.

19419 **(CONF-810417—11) Process-control instrumentation for advanced fossil-energy processes.** Doering, R.W.; O'Fallon, N.M. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 19p. NTIS, PC A02/MF A01. Order Number DE83007791.

From 90. AICHE national meeting; Houston, TX, USA (5 Apr 1981).

Instrumentation required for control of large-scale surface processes for coal and oil shale is lacking in a few critical areas. A recent study by Argonne National Laobratory (ANL) to specify the required instrumentation is reviewed. Work at ANL and other places to develop instruments for multiphase mass-flow measurements, on-line analysis, temperature, and level is described briefly.

19420 **(CONF-810528—17) Refractory/coal-slag compatibility studies: progress to date.** Kennedy, C.R. (Argonne National Lab., IL (USA)). Aug 1981. Contract W-31-109-ENG-38. 30p. NTIS, PC A03/MF A01. Order Number DE83007742.

From 83. symposium on nucleation and crystallization in glasses; Washington, DC, USA (3 May 1981).

Approximately 60 different refractories have been exposed to both acidic and basic molten coal slags at temperatures between 1500 and 1600°C. A dense fused-cast chrome-spinel refractory has demonstrated superior resistance to corrosion by a wide variety of coal slags ($CaO/SiO_2 = 0.2$ to 1.7). Refractories containing $>30\%$ chromia reacted with all types of slags to form complex spinel reaction products. Alumina refractories were intermediate in performance in acidic slags and poor in basic slags. Magnesia-chrome refractories containing free MgO performed poorly in acidic slags, but somewhat better in basic slags. Preferential dissolution of MgO was observed in all cases. 12 figures.

19421 **(CONF-821094—2) Chemistry of ash deposits in the U-GAS process.** Mason, D.M.; Rehmat, A.; Tsao, K.C. (Institute of Gas Technology, Chicago, IL (USA); Wisconsin Univ., Milwaukee (USA)). 1982. Contract AC21-82MC19301. 20p. NTIS, PC A02/MF A01.

From International conference on fouling of heat exchangers; White Haven, PA, USA (31 Oct 1982).

A cyclone operating at tempertures near that of the reactor fluidized bed has been used in the U-GAS pilot plant gasifier to remove entrained char particles from the product gas and return them to the bed. Essentially pure coal ash has been found to deposit in this hot cyclone. The deposits have been chemically analyzed and examined by optical and scanning electron microscopy. Ferrous sulfide is repsonsible for deposition under adverse conditions, but deposition of iron-rich ferrous aluminosilicates is the more serious problem. Deposition can be prevented by jacketing and cooling the wall surface of the cyclone. The effects of wall and gas temperatures have been investigated by means of a laboratory hot cyclone. The relationship of slag properties to deposition is briefly considered. 8 figures, 5 tables.

19422 **(CONF-821145—4) Corrosion and thermal-shock studies on slagging-coal-gasifier refractories.** Diercks, D.R.; Greenberg, S.; Bandyopadhyay, G. (Argonne National Lab., IL (USA)). Sep 1982. Contract W-31-109-ENG-38. 31p. NTIS, PC A03/MF A01. Order Number DE83007735.

From 7. materials for coal conversion and utilization conference; Gaithersburg, MD, USA (16 Nov 1982).

Refractory linings in slagging-coal gasifiers are subject to two principal modes of failure; wastage due to corrosive/erosive attack by the slag and cracking, spallation, and disintegration due to thermal shock. An extensive corrosion-testing program was conducted on candidate refractories since 1975. That program has recently expanded to include corrosion/erosion testing in moving slag, fundamental studies on corrosion mechanisms and kinetics, thermal-shock testing of commercial refractories, and the development of refractories with improved thermal-shock characteristics. The present paper reviews results obtained in past corrosion screening tests, summarizes work recently completed and presently under way in the expanded program, and briefly discusses future program directions. 11 figures, 7 tables.

19423 **(CONF-8006244—) KDV-pressure gasification of coal.** (Ministerium fuer Wirtschaft, Mittelstand und Verkehr des Landes Nordrhein-Westfalen, Duesseldorf (Germany, F.R.)). Jan 1981. 198p. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83900169.

From Colloquium on power plants for pressure gasification of coal; Essen, F.R. Germany (18 Jun 1980).

A colloquium was held on pressure gasification of coal with particular regard to the STEAG process; other concepts were only mentioned in passing. As a result, problems of the STEAG process could be discussed in more detail. Various combinations of power plant units are presented with their characteristics, and the Luenen plant is described in detail in order to enable a better classification of problems and their role in the overall concept. There is a report on the coal required for fixed-bed gasifiers which may be of importance for the mining sector as the physical and chemical requirements on the fuel are discussed, and coal preparation and compacting experiments are reported on. Advances in fixed-bed gasifiers are discussed in another paper. Dust removal and desulphurization projects for crude gas are explained in detail as well as waste water treatment. The state of the art of power plant technology for pressure gasification of coal, future trends, and environmental effects of power plants for pressure gasification of coal are discussed.

19424 **(CONF-8210127—1) Coal-gasification-process concepts.** Miller, C.L.; Tarman, P.B. (USDOE Assistant Secretary for Fossil Energy, Washington, DC. Coal Gasification Div.; Institute of Gas Technology, Chicago, IL (USA)). 1982. 21p. NTIS, PC A02/MF A01. Order Number DE83007157.

From Executive coal gas conference - EUROPE 82; Amsterdam, Netherlands (19 Oct 1982).

First Generation coal gasification continues to grow with the expansion of Lurgi process to make gasoline in South Africa and SNG in the United States. This moving-bed gasifier is no doubt the leading commercial application of coal gasification. This can probably be attributed to its operation at the elevated pressure that simultaneously increases coal throughput and broadens the utility of the raw Syngas product by lowering its coal. Other Second Generation processes also strive to achieve high pressure operation: Ruhrgas 100 to improve moving-bed gasification at 100 bars; Texaco, Shell, Koppers, and Saarberg-Otto to improve entrained-bed gasification at 20 to 40 bars; and U-GAS and Westinghouse and the pressurized Winkler to improve fluidized-bed operation at 10 to 40 bars. Operation at 20 to 40 bars greatly improves gasifier productivity and significantly broadens the use of the raw Syngas produced by all types of gasifiers. Future commercial trends will include the entrained- and fluidized-bed concepts at 20 to 40 bars while even higher operating pressures will be used for the Lurgi moving-bed concept.

19425 **(DOE/EIA—0121(81/3Q)) Coke plant report. Quarterly energy data report, July-September 1981.** Vannoy, C.E.; Watson, W.M. (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). 1981. 22p. NTIS, PC A02/MF A01. Order Number DE83008050.

This report presents US coke plant data for April through June 1981 covering the following subjects: coal receipts, coal carbonization; coke and breeze production, coke and breeze distribution, coal and coke stocks, and coke imports and exports. Data for the previous quarter (first quarter 1981), the same quarter previous year (second quarter 1980), and for the year to date 1980 and 1981 are also given so that comparisons may be made. The data presented in this report were submitted by all companies producing coke and breeze at US coke plants. There were 58 coke plants in operation during the second quarter of 1981. The term United states includes the 50 states and the District of Columbia.

19426 **(DOE/EIA—0121(81/4Q)) Coke plant report. Quarterly energy data report, October-December 1981.** Vannoy, C.E.; Watson, W.M. (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). 27 May 1982. 33p. NTIS, PC A03/MF A01. Order Number DE83008049.

This report presents US coke plant data for October through December 1981 covering the following subjects: coal receipts, coal carbonization, coke and breeze production and distribution, coal and coke stocks, and coke imports and exports. Data for the previous quarter (third quarter 1981), the same quarter for the previous year (fourth quarter 1980), and the year to date for 1980 and 1981 are also given so that comparisons may be made. The data presented in this report were submitted by all companies producing coke and breeze at US coke plants. There were 56 coke plants in operation during the fourth quarter of 1981. The term United states includes the 50 states and the District of Columbia.

19427 **(DOE/ET/10143—T31) H-Coal Pilot Plant: worker health-protection training program at the H-Coal Pilot Plant, E and H-3.** Hill, R.H. (Ashland Synthetic Fuels, Inc., KY (USA)). Dec 1982. Contract AC05-76ET10143. 27p. NTIS, PC A03/MF A01. Order Number DE83006749.

In order to convey factual health protection information to process area workers at the H-Coal Pilot Plant, a slide/tape pesentation and Health Information Brochure were developed. Regular plant workers received training with the slide/tape presentation at least annually. Temporary plant workers received the Health Information Brochure before beginning work in process areas. The training effort was successful in conveying factual toxicity information to workers and training workers to follow safe work practices and personal hygiene procedures.

19428 **(DOE/ET/10143—T34) H-Coal Pilot Plant: radiation safety.** Gray, J.H. (Ashland Synthetic Fuels, Inc., KY (USA)). Nov 1982. Contract AC05-76ET10143. 155p. NTIS, PC A08/MF A01. Order Number DE83005848.

During the design phase of the H-Coal Pilot Plant the instrumentation evaluation for the high pressure vessels indicated the need for nuclear gauges. Therefore, thirty-eight nuclear gauges were installed on 18 vessels at the plant. Their uses ranged from empty/full switches to determining the density of a flowing hydrocarbon stream. Installation and use of nuclear gauges requires a Radioactive Material License granted by Kentucky Department for Human Resources Radiation Control Branch. The processing time from application to license issuance was 13 months. The Radiation Safety Program involved preparing Vessel Entry Procedures, making vessels, writing a Nuclear Safety Manual, and holding training sessions for plant employees. In addition to training personnel in the use of the nuclear gauges, monitoring of the instruments was required. Monitoring was accomplished by wipe testing, surveys and exposure badges. All monitoring results clearly demonstrated the safety of the nuclear gauges. ASFI made any needed repairs and elected on a few installations to add a small amount of shielding to lower the radiation field intensity. These cases were only minor and never involved any risk to plant personnel. The experience at the H-Coal Plant with nuclear gauges has shown them to be safe and sound instruments. Monitoring was performed more often than required, and it can be done less frequently at similar installations. The Radiation Safety program with its signs, documents, procedures and training sessions was quite successful. Many of the Program's features are applicable in any plant with nuclear gauges.

19429 **(DOE/ET/13702—T1) VPI-4.8 - investigation of carbon monoxide disintegration of refractories in coal gasifiers.** Morena, R.; Slusser, L.; Brown, J.J. Jr. (Virginia Polytechnic Inst. and State Univ., Blacksburg (USA). Dept. of Materials Engineering). [nd]. Contract AC05-80ET13702. 6p. NTIS, PC A02/MF A01. Order Number DE83005670.

Refractories used in coal gasification vessels and piping are exposed to mixtures of hydrogen, steam, hydrogen sulfide, methane, carbon monoxide, and other gases over a wide range of tempertures and pressures. Many refractories are known to deteriorate when exposed for long periods of time to CO-containing atmospheres, especially if the temperature is below about 1300°F and if the refractory contains any iron containing compounds. It is, therefore, important to develop experience and engineering data on these refractories under simulated coal gasifying conditions and to attempt to determine the effect of each identifiable variable on the CO resistance of the refractories used in coal gasifiers. The objectives of this investigation are (1) to determine whether or not CO disintegration is likely to occur in the refractories used in coal gasifiers, and (2) identify the conditions under which CO disintegration of the refractories can be expected to be a serious problem. It is also a goal of this investigation to develop information that will assist in the identification of refractory deterioration or failure that is caused by CO disintegration. Results of exposure in a flow-through test vessel (500°C, 1000 psig, 50 h) are given for several costable refractories. The gases involved were CO and simulated gasification atmospheres.

19430 **(DOE/ET/14700—13) Chemistry and catalysis of coal liquefaction: catalytic and thermal upgrading of coal liquid and hydrogenation of CO to produce fuels. Quarterly progress report, October-December 1982.** Wiser, W.H. (Utah Univ., Salt Lake City (USA). Dept. of Mining and Fuels Engineering). Jan 1983. Contract AC22-79ET14700. 115p. NTIS, PC A06/MF A01. Order Number DE83005696.

Projects reports are presented for the following tasks: (1) chemical-catalytic studies; (2) carbon-13 NMR investigations of coal derived liquids (CDL) and coal; (3) catalysis and mechanism of coal liquefaction; (4) momentum, heat, and mass transfer in cocurrent flow; (5) fundamental chemistry and mechanism of pyrolysis of bituminous coal; (6) catalytic hydrogenation of CD liquids and related polycyclic aromatic hydrocarbons; (7) denitrogenation and deoxygenation of CD liquids and related N- and O-compounds; (8) catalytic cracking of hydrogenated CD liquids and related hydrogenated compounds; (9) hydropyrolysis of CD liquids; (10) systematic structural-activity study of supported sulfide catalysts for coal liquids upgrading; (11) basic study of the effects of coke and poisons on the activity of upgrading catalysts; (12) diffusion of polyaromatic compounds in amorphous catalyst supports; and (13) catalyst research and development. Highlights for this period are: (1) tests for hydrodesulfurization (HDS) and hydrogenation activities of a number of catalysts carried out at both atmospheric and elevated pressure in the same reactor showed good correlation between low and high pressure results. This means that the atmospheric pressure tests adopted for ranking of activity of various catalysts should be the same under high pressure test conditions; and (2) enhancement of HDS activity of thiophene at levels of 2,6-dimethylpyridine adsorbed on a commercial CoMo/Al_2O_3 catalyst was confirmed in repeat experiments. This very unusual result (other N-compounds tested gave expected lowered HDS activity) indicates that adsorption on a site adjacent to the HDS site can activate the HDS site, provided that the HDS site is not itself blocked, e.g., by steric hindrance of the adsorbed molecule.

19431 **(DOE/FC—1011) Homogeneous catalysis of lignite liquefaction with hydrogen sulfide.** Baker, G.G.; Willson, W.G.; Farnum, B.W.; Stenberg, V.I. (Department of Energy, Grand Forks, ND (USA). Grand Forks Energy Technology Center; North Dakota Univ., Grand Forks (USA). Dept. of Chemistry). 1983. 37p. (CONF-830308—5). NTIS, PC A03/MF A01. Order Number DE83006946.

From American Institute of Chemical Engineers national meeting; Houston, TX, USA (27 Mar 1983).

Based on our tests to date we can summarize our thoughts on H_2S addition as follows: the incorporation of sulfur into distillable products is minimal and occurs as elemental sulfur and light organics. There are no apparent additional health hazards associated with hydrocarbon distillates produced with H_2S addition. Methylene bond cleavages of the type represented by diphenylmethane are initiated by elemental S with H_2S serving as an H-donor. Based on tubing bomb tests, H_2S does not catalyze liquefaction of lignite by H_2. As demonstrated in tubing bomb, autoclave and CPU experiments, H_2S catalyzes the reaction of lignite with CO and water, probably by promoting the water gas shift reaction. In bottoms recycle, added H_2S significantly lowers recycle slurry viscosity. Recycle product produced with added H_2S contains lower boiling distillates and enhanced levels of hydroaromatics. H_2S addition enables lignite liquefaction to be accomplished at temperatures significantly below those necessary for non-catalyzed reaction and thus has the potential to reduce H_2 consumption through decreased hydrocarbon gas production. 9 figures, 5 tables.

19432 (DOE/FE/05147—1371) Coal-gasification basic research and cost studies. Quarterly report No. 5. (McKee (Davy) Corp., Cleveland, OH (USA)). 14 Jan 1983. Contract AC21-81FE05147. 71p. NTIS, PC A04/MF A01. Order Number DE83007400.

Work was continued on basic research and cost studies supporting the Department of Energy's coal gasification program. Two major activities or tasks are being performed. The first activity (Task I) is the development of a process or processes to produce agglomerates from coal fines suitable for use as a feed to fixed-bed gasifiers. Seven US coals are being investigated. The second activity (Task II) is a design and cost study to examine the effects of gasifier selection on overall plant costs for a commercial-scale coal gasification facility. More than 100 pelletizing runs were performed during the quarter; these were in addition to the pelletizing runs made earlier. Like with briquettes, a large number of coal-binder compositions showed promise as a good gasifier feed material. Although, in general, the pellets were weaker than briquettes of similar compositions, many pellets displayed reasonably good strengths. The principal problem with pellets was their low green strengths. The strengths of pellets generally increased significantly upon drying and fell off only slightly during exposure to gasification temperatures. Of the binders examined, bentonite and gilsonite were found to be best. Task II work centered on: (1) bringing the original cost estimates for the proposed Erie Mining gasification plant up to date; and (2) designing a large briquetting facility, incorporating this facility into the Erie Mining plant designs, and developing cost estimates for the complete plant.

19433 (DOE/MC/14273—1325) Dynamic analysis of slurry letdown valves at H-Coal pilot plant. (Mechanical Technology, Inc., Latham, NY (USA)). Dec 1982. Contract AC21-80MC14273. 73p. NTIS (US Sales Only). Order Number DE83004680.

Mechanical Technology Incorporated (MTI) is under contract to provide technical services for the improvement of performance of critical equipment required in the coal conversion process plants. A key service required in these plants is the level control of the effluent separator of the reactor vessel where coal conversion process takes place. This function is usually served by discharge of the liquid phase slurry in the separator through valves commonly called letdown valves. A number of technical problems have been experienced with the slurry letdown valves in the pilot plant operations. These include: excessive wear rate of critical valve components as a result of erosion, corrosion, and flashing; breakage of valve trim as a result of excessive flow induced vibration (fatigue) and/or sudden high bending load; breakage of valve stem as a result of excessive structure vibration (fatigue) of valve body, actuator, and associated piping; and coking formation in the valve eventually causing plugging. An approach to providing engineering data necessary for the understanding and eventual reduction/elimination of these problems is vibration measurement and structural analysis, including design analysis of structural damping characteristics. MTI has performed the following analysis for the understanding of the basic vibration phenomenona of the slurry letdown valves and made actual vibration measurements of the letdown valves presently under operation at the H-Coal pilot plant: lateral natural frequency and mode shape calculations of the valve stems; axial natural frequency calculations of the stems including the actuators; and valve body natural frequency calculations, including calculations for nearby piping and supports.

19434 (DOE/MC/14731—1297) Review of in-bed hydrocarbon, alkali, and trace metals control in coal-conversion processes. Tamhankar, S.S.; Wen, C.Y. (West Virginia Univ., Morgantown (USA). Dept. of Chemical Engineering). Aug 1981. Contract AT21-81MC14731. 216p. NTIS, PC A10/MF A01. Order Number DE83006376.

The overall objective of this study was to identify and assess possible materials that can be added in or near the bed of advanced coal combustors or gasifiers for the control of emissions of hydrocarbons and alkali and trace metals. A major conclusion of the literature search conducted is that studies on the monitoring of the contaminants emission from operating combustors or gasifiers are extremely scarce. Some studies of this nature exist for alkali metals, but are nonexistent for trace metals. In the case of hydrocarbons, only one source of data is available, which is based on a laboratory scale fixed-bed reactor. Based on the limited data available from direct studies and the thermodynamic and physico-chemical data compiled in this report for probable sorvent materials, it appears that various silica-alumina compositions and some iron-containing materials show promise with respect to the control of alkali metals, trace metals and hydrocarbons. Some more specific materials identified are: clays and diatomaceous earth for alkali and trace metals, high surface area chars, sulfides of transition metals and iron for cracking hydrocarbons. Compounds of Mo, Pb, Hg and V, which are mostly toxic, are found to be captured by aluminosilicates, forming the corresponding alumino-silicate compounds. Some of the compounds of Mo, pb and fluorine occurring in a combustor or a gasifier can be adsorbed by using a bed of alumina maintained at high temperatures.

19435 (DOE/METC—82-51) Advanced gasification projects. Ghate, M.R.; Friggens, G.R. (eds.). (Department of Energy, Morgantown, WV (USA). Morgantown Energy Technology Center). Sep 1982. 219p. (CONF-8206141—). NTIS, PC A10/MF A01. Order Number DE83004848.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

The Second Annual Advanced Gasification Projects Contractors' Meeting Proceedings was sponsored by the US Department of Energy Morgantown Energy Technology Center, Morgantown, West Virginia, and held June 22-24, 1982, at Morgantown, West Virginia. Forty-four papers have been entered individually into EDB and ERA. (LTN)

19436 (DOE/METC—82-51, pp 3-7) **Studies of initial reaction steps in the gasification of coal and selected model compounds.** Margrave, J.L. (Rice Univ., Houston, TX). Sep 1982. NTIS, PC A10/MF A01. Contract FG22-81PC40792.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

The various experiments in this study were designed to produce data from reactors that simulate the early stages of coal gasification by bringing the coal quickly up to reaction temperature. Highly reactive gas phase intermediates exit rapidly from the reaction zone and are then deposited on a 10 K reflective surface where further reaction is rapidly quenched. The products, when isolated in a non-interactive solid such as nitrogen, argon, or even dry air, should exhibit well-defined spectra that allow the precise measurement of isotopic shifts and peak positions. Free radicals can be detected by characteristic infrared spectra or EPR spectra. The presence of a specific intermediate can also be monitored with a fast time response quadrupole mass spectrometer. The combination of mass spectrometric and matrix isolation infrared and EPR spectroscopic techniques serve as an effective probe for the existence of transient gaseous reaction intermediates.

19437 (DOE/METC—82-51, pp 20-23) **Kinetics of coal pyrolysis and gasification.** Walker, P.L. Jr. (Pennsylvania State Univ., University Park). Sep 1982. NTIS, PC A10/MF A01. Contract AC01-79ET14882.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

All aspects of the studies lead to enhanced fundamental understanding of gasification phenomena at ambient and elevated pressures of steam and syn-gas. It will provide significant information on kinetics, product yields, and structural changes of coals/chars brought about by these processes. Pyrolysis and gasfication studies in an atmospheric pressure entrained laminar flow reactor are being conducted on three coals (lignite, subbit C and bituminous) in order to examine early stages of gasification. Kinetics of weight loss are determined by an ash tracer technique. Data are to be taken as functions of coal particle size, temperature, and residence time. Effects such as preoxidation (for the bituminous coal) and level of exchangeable cations (for other coals) are to be examined. Methane Production During Pyrolysis and Gasification Microreactors are to be designed and constructed in order to study pyrolysis and gasification in steam of five coals at ambient and elevated pressures. The gaseous products (CH_4, CO_2, CO, and H_2) and tar evolution will be monitored continuously via NDR analyzers and optical density measurements, respectively. Reactions will be performed on chars with wet and dry H_2/CO (ratio 3:1) and mixtures of steam with H_2, CO, and N_2. The effect of added H_2S in gas stream will be examined. In addition to studying CH_4 formation from chars from two raw coals (lignite and bituminous), both coals will be doped with varying levels of potential catalysts (Ca, K, Na, and Fe) by ion-exchange (lignite) or impregnation prior to carbonization (bituminous). Formation of CH_4 via these reactions is to be followed by NDIR and TGA over a range of temperatures and pressures.

19438 (DOE/METC—82-51, pp 24-29) **Short residence time hydropyrolysis.** Sinisgalli, A.J. (Princeton Univ., NJ). Sep 1982. NTIS, PC A10/MF A01. Contract AC01-79ET13153.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

Previous work had established the general features of the yields to be expected from short residence time pyrolysis and hydropyrolysis. However, results from different labs using different reactors were difficult to reconcile because the heating rates and residence times intrinsic to the reactors were different. Consequently, the necessarily approximate models proposed could only be fitted to data from a specific reactor with a specific coal. In short, neither the experiments nor the models were sufficiently fundamental to be generally useful. Therefore, experimental studies were proposed with a new reactor system to (a) furnish kinetic data on pyrolysis and hydropyrolysis of several coals over a broad range of temperatures (600° to 1000°C), heating rates (10^2 to 10^4 K/s), particle sizes (50 to 500 μm), pressures (0 to 100 atm), gas atmospheres (pure He to pure H_2), and reaction times (0 to 500 ms) with various pretreatments and (b) develop kinetic models including effects of coal softening, mass transfer, and homogeneous gas phase reactions.

19439 (DOE/METC—82-51, pp 30-34) **Coal plasticity, agglomeration, and volatiles secondary reactions during gasification.** Howard, J.B. (Massachusetts Inst. of Tech., Cambridge). Sep 1982. NTIS, PC A10/MF A01.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

Previous MIT studies provided quantitative data on the effects of reaction conditions, coal type, native mineral matter, and inorganic additives on yields, composition, and rates of formation of products from the rapid pyrolysis and hydropyrolysis of coal. This work was intentionally focused on the initial decomposition (primary pyrolysis) of the coal. However, it revealed that full understanding of coal pyrolysis behavior demands better quantitative data and interpretive models of the post-pyrolysis reactions of freshly formed volatiles. It was also shown that inorganic additives such as calcite and lime modify gas and tar yields. The proposed research would involve measuring swelling, agglomeration, and viscosity of softening coal, and rates and extents of secondary reactions as a function of temperature, contact time, total pressure, composition of reactive atmosphere, and method and extent of treatment of coal with inorganic additives. Data on secondary reactions of fresh coal pyrolysis tars would be obtained using a versatile, two-zone packed bed tubular reactor system. This facility is in place and has already provided data on the rates and extents of homogeneous reactions of fresh coal pyrolysis tars. Special features of this facility include separation of tar generation reactions from tar secondary reactions; ability to achieve controlled and virtually immediate contacting of freshly generated coal pyrolysis tar with freshly generated pyrolysis char of well-known surface characteristics; independent variation of total pressure and volatiles residence time with good time resolution; isolation of contributions of fluid-solid and vapor-phase processes to the overall tar secondary reaction behavior, amenability to model compound experiments for mechanistic studies; and ability to decouple mass transfer from chemical kinetic effects.

19440 (DOE/METC—82-51, pp 35-38) **Effects of inorganics and pore structure on char gasification kinetics.** Perlmutter, D.D. (Univ. of Pennsylvania, Philadelphia). Sep 1982. NTIS, PC A10/MF A01. Contract AC21-81MC16117.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

The object of this research is to distinguish the contributions to overall kinetics that are related to the pore structure from those attributable to surface reaction chemistry. To this end, the proposed research will focus on three areas: (a) kinetics and porosity, (b) inorganic additives, and (c) data interpretation. A range of representative chars will be prepared by pyrolyzing coals under nitrogen using different heating rates and temperatures to obtain a series of chars with similar chemical composition but different pore structure. These chars will be reacted with oxygen and/or steam under various conditions of concentration and temperature to determine rates at different conversion levels. Depending on the particle size, experimental conditions will be selected to insure chemical kinetic control. A Thermogravimetric Analyzer (TGA) will be used to monitor the conversion and reaction rate with respect to time. The pore size distribution and the BET surface area of the reactant chars will be measured at each conversion level by mercury intrusion porosimetry and nitrogen adsorption, respectively. A major objective of this part of the research is to follow the changes of pore structure and reaction rate that occur during the course of reaction, and to correlate these changes with the initial pore structure of chars. This information will make it possible to determine the intrinsic reaction rate constant without the interference of structural parameters.

19441 (DOE/METC—82-51, pp 39-44) **Heterogeneous kinetics of coal gasification.** Calo, J.M. (Brown Univ., Providence, RI). Sep 1982. NTIS, PC A10/MF A01. Contract FG22-81PC40786.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

The rational design of coal gasifiers and gasification systems requires fundamental understanding of the physical and chemical phenomena heat occur during the conversion process. Also, just like many other chemical reactors, coal gasifiers are heterogeneous by nature; this always tends to complicate design and analysis because of the possibility of interphase and intraphase heat and mass transport resistance obfuscating the intrinsic chemical kinetics. In view of this situation, the primary objectives of the current project are to develop a fundamental description of the intrinsic chemical kinetics involved in coal-char gasification and to evaluate the role of heat and mass transport processes via experimental techniques specifically directed at controlling these processes. Gradientless operation allows determination of intrinsic kinetics because of minimization of external interphase heat and mass transport gradients. Transient techniques allow determination of characteristic reacion mechanisms. Rapid transient behavior is resolvable with supersonic, modulated molecular beam sampling. Measurements can be performed at realistic coal-char gasification conditions, i.e., 1400°F at 550 psi, and 3600 psi at 1000°F. Gas phase reactions can be differentiated from heterogeneous reactions by variation of the gas-to-solids ratio. The experimental system can be readily adapted to accommodate other diagnostic techniques, i.e., laser Raman and resonance fluorescence for gas phase reactions. The experimental system can be readily adapted to kinetic studies of other gas-solid, gas-liquid, or homogeneous gas phase systems of relevance to coal processing and fuels science. Automated control and data collection can provide the capability to investigate complex kinetic systems.

19442 (DOE/METC—82-51, pp 45-48) **Influence of changing particle structure on the rate of gas-solid gasification reactions.** Debelak, K.A. (Vanderbilt Univ., Nashville, TN). Sep 1982. NTIS, PC A10/MF A01. Contract AC21-81MC16053.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

Changes in structural parameters, such as surface area available for reaction, porosity, and pore size distribution, will markedly affect the rate of gas-solid reactions. Accompanying these changes in structural parameters are changes in the resistance to diffusion of gaseous products and reactants through the pores of the solid. A quantitative measure of the effect of pore diffusion is given by the particle's effectiveness factor. This is the ratio of the reaction rate, under diffusion controlled conditions, to that which would occur if the concentration of reactants were equal to the surface concentration. The effectiveness factor is a unique function of the particle's effective diffusivity. By measuring the changes of the solid structure and effective diffusivity with conversion of the solid and including their effect in an overall rate expression, a clear understanding of the nature of gas-solid reactions can be attained. Studies have been conducted in this area; however, few have made measurements of the changes in these parameters with solid conversion. Most studies mention that the changes in the solid affect the reaction rate and attempt to include parameters in the reaction rate model to account for them. The objective of this work is to determine the changes in the particle strucure of coal as it undergoes the reaction, $C + CO_2 \rightarrow CO$, and to include the effect of these changes in surface area and effective diffusivity on the overall reaction rate. This research will lead to a better understanding of coal gasification reactions.

19443 (DOE/METC—82-51, pp 49-51) **Coal reactivity.** Gardner, N. (Case Western Reserve Univ., Cleveland, OH). Sep 1982. NTIS, PC A10/MF A01.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

A novel means for obtaining thermogravimetric kinetic data has been developed, viz., the entire reactor plus contents are weighed during the course of a run. A 130 kg (300 lb) reactor with thin wall flexible gas lines and thermocouples attached is suspended from a large balance. The reactor has a sample capacity of 0.5 kg (1 lb). With all lines attached, the balance has a sensitivity of 0.2 g. Control over the fluid mechanical regime is therefore possible allowing elimination of external mass transfer effects, operation as a true differential bed reactor, and permitting measurement of meaningful product compositions. The kinetics of the devolatilization and gasification of non-caking coals will be measured in the temperature range 650° to 980°C (1200° to 1800°F) and pressures from atmospheric to 1500 psia. Gasification to CO_2, H_2O, H_2, and mixtures thereof will be performed. The kinetic measurements will be done in the continuously weighed thermogravimetric analyzer. Fluidized and fixed sample beds will be used. Product gas compositions will be determined. The specific surface area, pore volume distribution and morphology of the samples from Task 1 will be obtained as a function of total carbon conversion. The techniques of CO_2 adsorption, mercury porosimetry, scanning electron microscopy, and high voltage microscopy will be used.

19444 (DOE/METC—82-51, pp 52-55) **Research on the mechanisms of gasification reactions in the catalysis of coal, char, and other carbonaceous materials (catalytic gasification mechanisms).** Kosky, P.G. (General Electric Co., Schenectady, NY). Sep 1982. NTIS, PC A10/MF A01. Contract AC21-80MC14591.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

The gasification of coals proceeds by catalysis whether the catalysts are adventitious or added to promote desired reactions Catalysts are added to coals for several reasons - to promote faster reactions, to enhance selectivity of reactions, to foster in situ tar cracking, and to reduce swelling behavior. It is well known that certain salts of the alkali, alkaline earth, and transition metal groups have advantages as gasification catalysts for carbonaceous materials. The former are effective for CO_2 and steam gasification producing CO and H_2, while the transition metal group are active for direct hydrogenation of carbons to CH_4. This study focuses on the mechanisms of catalysis of coal by added salts during gasification. The term mechanisms refers to a determination of the elementary steps by which gasification is affected, the influence of adventitious coal minerals, and the process(es) by which coal/catalysis contact is established. The work includes determination of gasification kinetic parameters for a variety of coal chars under the influence of several catalysts present in varying degrees. The impact of this study will lead to an expanded understanding of gasification catalysis. In particular, elucidation of mechanistic aspects has the potential of leading to new concepts in catalysts - in the method by which they are dispersed, in the composition of desirable catalytic salts, or by simplifying their recovery from the residue coal ash.

19445 (DOE/METC—82-51, pp 56-59) **Investigation of coal gasification catalysis reaction mechanisms.** Trilling, C.A. (Rockwell International Corp., Canoga Park, CA). Sep 1982. NTIS, PC A10/MF A01. Contract AC21-80MC14592.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

Catalysts for coal char gasification reduce reaction time and plant capital costs and add material costs and complexity to process. Detalied knowledge of catalysis mechanisms will result in more efficient use of catalysts, reduced materials costs, gasification at lower temperature, and increased yield of higher valued products. Better understanding of catalysis can be achieved by application of broad spectrum of advanced analytical techniques and detailed correlation between the gasification rate and the physical and chemical changes in the char. The work was: determine gasification rates of coal char using: reactant gases (CO_2, H_2O, H_2, gas mixtures), catalysts (alkali metal carbonates, potassium salts, calcium oxide), and control chars without catalysts; analyze gases produced during gasification; use tagged compounds to determine origin of reaction products and catalyst role (D_2, D_2O, K_2CO_3-carbon-13); analyze partially gasified chars using broad range of instrumentation (NMR, EPR, XPS, FTIR); examine char physical strucure using SEM, BET; and develop mathematical models of reaction mechanisms consistent with experimental data.

19446 (DOE/METC—82-51, pp 60-63) **Catalytic gasification of coal char.** Wise, H. (SRI International, Menlo Park, CA). Sep 1982. NTIS, PC A10/MF A01. Contract AC21-80MC14593.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

In our experimental program to date, major emphasis has been placed on three experimental techniques to provide information on chemical pathways and intermediates in char gasification reactions: temperature programmed reaction; high-temperature Knudsen mass spectrometry; and in-situ electron spin resonance spectroscopy. Experimental tools have been selectively employed to examine the behavior of several catalyst salts in contact with a coal-derived char. An initial and essential step in the activation of coal char for gasification is an interaction between the catalyst and the carbon. This interaction is an interaction between the catalyst and the carbon. This interaction occurs at elevated temperatures at the boundary between the catalyst and char phases even in the absence of the gaseous reactants (CO_2 or H_2O) required for gasification. There is evidence, that in the case of K_2CO_3, the presence of H_2O, in an adsorbed state on the char or as a hydrate of the inorganic salt, converts the catalyst to KOH, which melts and spreads over the surface of the char as a liquid film. The composition of this liquid inorganic phase will be determined by a dynamic balance between a reducing process at the char interface and an oxidizing process on the surface in contact with the gaseous reactant, steam, or CO_2.

19447 (DOE/METC—82-51, pp 64-66) **Catalytic effects in coal gasification.** Granoff, B. (Sandia National Labs., Albuquerque, NM). Sep 1982. NTIS, PC A10/MF A01.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

It has been known for some time that various inorganic species have a catalytic effect on the gasification rates of carbon, graphite, and synthetic chars. Various studies have shown that the addition or removal of coal ash can significantly affect the gasification of coal. Naturally occurring minerals in coal have an effect on pyrolysis and gasification. In this work, the effect on coal hydrogasification of adding various iron containing minerals to a Pittsburgh seam coal was studied. The product gas composition was monitored during the hydrogasification process to see if the potential catalyst altered the product distribution. The physical effect of mineral addition was determined by measuring surface area and pore volume of chars formed from these samples. The hydrogen transfer activity of the pure iron minerals was measured through H_2/D_2 exchange experiments. The catalytic activity of various reducible iron containing minerals varied in the following order: $Fe_2O_3 > Fe_3O_4 > FeSO_4 > FeS_2 > FeO > Fe$. Previous work suggested that the catalytic activity of iron minerals was due to reduced iron dissociation of hydrogen. Presently results of experiments that measured the physical effect of the catalyst upon coal, the hydrogen transfer effect of the catalyst upon coal, and the hydrogen transfer activity of the pure-reduced minerals are being evaluated. The project will determine in detail the mechanism by which iron minerals enhance hydrogasification rates and evaluate high pressure TGA results to determine the catalytic effect of the iron containing minerals at process conditions.

19448 (DOE/METC—82-51, pp 67-71) **Temperature-time-reaction medium controlled hydropyrolysis.** Park, W.K. (Monsanto Research Corp., Miamisburg, OH). Sep 1982. NTIS, PC A10/MF A01. Contract AC04-76DP00053.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

The batch jet reactor consists of four functional sections: combustion, mixing, reaction, and quench; and it provides the required reaction conditions incorporating explosive heating, sonic jet mixing, short residence time, and aerodynamic quenching. Similarly, the flow jet reactor consists of the same four functional sections for the required fast heating, jet mixing, short residence time, and rapid quenching. The sequence of the process is to (1) generate a hyper-velocity, high temperature combustion gas from H_2 and O_2 at various mixtures, (2) inject pulverized coal streams into this hot jet in the nozzle, (3) promote fast turbulent flow with various reaction mediums in a short (6 to 18 inch) reaction section, and (4) rapidly quench products. The experimental findings obtained from the batch reactor study revealed that: coal particles can be rapidly mixed and heated to reaction temperatures within 1 ms; 20 to 90 percent conversion of coal to gaseous and liquid products can be achieved within 1 ms reaction time; and hydrocarbons (saturates and unsaturates, i.e., ethylene and acetylene) and synthesis gas can be produced in controlled reaction medium. Similarly, the feasibility of the UFR process concept has been proven with the flow reactor. The preliminary results obtained thus far show that: 20 to 80 percent conversion of coal in less than 5 ms can be achieved; production of hydrocarbons (saturates and unsaturates, i.e., ethylene and acetylene) and synthesis gas can be selectively controlled; and the temperature-time-reaction profile can easily be varied to identify some effects of operating parameters on the coal conversion scheme.

19449 (DOE/METC—82-51, pp 72-77) **Development of BEACON Technology.** Grossman, A.P. (TRW, Inc., Redondo Beach, CA). Sep 1982. NTIS, PC A10/MF A01. Contract FC21-80MC14400.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

BEACON stands for BTU Extraction And CONcentration. The process is based on the patented discovery that carbonaceous materials that are catalytically extracted from low heating value gases are extremely reactive with hydrogen or steam. The process being developed around this chemistry upgrades the low BTU producer gas derived from the partial oxidation of coal in two steps. The first step involves the deposition of carbon on the ferrous metal catalyst, which is then separated from the hot depleted fuel gas. The carbonaceous material is then reacted with either hydrogen or steam to produce methane in the second step of the process. The hot, depleted fuel gas is very efficiently utilized to produce cogenerated electric power. Production of SNG and combined-cycle electric power from low heating values fuels via the BEACON system is inherently more efficient than conventional systems producing these same products from coal-derived medium-BTU gas. Proof-of-principle testing and research in small, atmospheric pressure fixed-bed reactors provide a good data base in support of the process chemistry. Additional experiments in fixed, fluid, and entrained bed reactors at pressures up to 20 atmospheres provided additional global reaction rate data and led to selection of fluid-bed reactors as a preferred mode of operation. The carbon deposition reaction proceeds rapidly over several different types of catalysts at temperatures of 450° to 500°C. Reaction rates are relatively insensitive to pressure. New catalysts have been developed that exhibit excellent steam gasification activity and stability at temperatures as low as 550°C.

19450 (DOE/METC—82-51, pp 78-80) **Photoassisted electrolysis applied to coal gasification.** Kasner, E.E. (Univ. of New Mexico, Albuquerque). Sep 1982. NTIS, PC A10/MF A01. Contract AC21-81MC16377.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

While conventional coal gasification uses steam-carbon reactions to produce low BTU coal gas through a strongly endothermic reaction at very high temperatures (800° to 1000°C), the proposed method uses solar radiation to produce the desired gas mixture at low temperature. Holes generated at the n-type semiconductor electrode surface upon illumination oxidize coal to carbon oxides, whereas electrons carried through the external wire to the counter electrode (metal) reduce water to hydrogen. Conversely, electrons generated at the p-type semiconductors reduce water, while holes at the metal electrode oxidize coal. The net result is gasification of a coal slurry in water utilizing solar radiation energy. The reaction occurs at very low temperature. Solar radiation having lower energy than the band gap of semiconductor electrodes is also utilized to heat up the slurry, reducing activation energy and thus increasing photocurrents. Currently, experiments are being carried out at the n-SnO_2 thin film electrode; a significant amount of photocurrents is observed for coal oxidation upon illumination. This implies that oxidation currents of coal are indeed enhanced by illumination, and thus solar radiation energy can be used for coal gasification. Also, the oxidation mechanism of coal slurries have ben elucidated. Coal is oxidized catalytically by iron (III) leached out, and iron (II) produced in the process is reoxidized to iron (III) to complete a cycle. Advantages of this method of coal gasification include that (a) coal gasification is accomplished with the aid of solar radiation, (b) low temperature operation is possible, and (c) cleaner gas products are produced.

19451 (DOE/METC—82-51, pp 81-85) **Steam pyrolysis of coal for two-stage gasification.** Gannon, R.E. (Everett Research Lab., MA). Sep 1982. NTIS, PC A10/MF A01. Contract AC21-81FE05123.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

In a series of pyrolysis studies using a diverse assortment of heating techniques and devices, it was shown that up to 80 percent of the carbon in coal could be liberated as volatile matter in less than 100 milliseconds. The composition of the product depended on the ambient atmosphere. That is, if the pyrolysis was carried out in hydrogen, C_2H_2 and CH_4 were the main products; whereas if the ambient gas was steam, the products would be CO and H_2. While Avco was carrying out these experimental studies, a GRI report by the R.M. Parsons Company comparing gasification processes pointed out the potential benefits of steam pyrolysis in a two stage gasification process. At the time Avco had demonstrated extremely high yields by way of steam pyrolysis in a batch reactor. It remained then to demonstrate that the same high yields via steam pyrolysis could be obtained in a flow reactor. The present program is directed at developing a suitable flow reactor specifically designed to take advantage of flash pyrolysis in a steam environment. The advantage of steam pyrolysis is that it can lead to a process with higher gas yields and lower oxygen demands. It will also allow reactor designs that are a small fraction of the size of present units. Comparison of the equations for partial oxidation and steam pyrolysis shows that the yield of product gas is about 70 percent higher in the steam pyrolysis case. Although the steam pyrolysis reaction is endothermic, it can be shown that even for a heat balanced reaction providing only enough oxygen to drive the steam pyrolysis, that a 22 percent higher yield using 33 percent less oxygen can be realized if steam pyrolysis reactions are optimized. In addition to the operating advantages, use of the flash steam pyrolysis will also have a significant effect on capital costs as the reactors will be only a fraction of the size of present designs.

19452 (DOE/METC—82-51, pp 86-92) **Studies toward improved techniques for gasifying coal.** Graff, R.A.; LaCava, A.I.; Weinstein, H. (City College, New York, NY). Sep 1982. NTIS, PC A10/MF A01. Contract AC21-80MC14875.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

The aim is to provide an experimental basis for improving the economic attractiveness of coal gasification by the cogeneration of gaseous fuel and high market value, light liquid fuel through flash pyrolysis in steam and steam-hydrogen mixtures. Initial studies of steam pyrolysis carried out (under a previous DOE contract) with a flash tube reactor provided up to 68 percent carbon conversion of Illinois No. 6 coal to liquids in 50 atm of steam, 900°C, one second vapor residence time, and 2 minutes solids residence time. Yields of gases and liquids obtained from the flash pyrolysis of raw coal in steam and steam-hydrogen mixtures will be determined in laboratory scale equipment. Liquids will be fractionated using SESC and the fractions analyzed by elemental analysis, gas chromatography, mass spectrometry, HPLC as required to characterize the liquids. A reactor operating to 100 atm under pure steam from 500°C to 1000°C with 100 mg. ground coal, vapor residence times from 0.1 to 20 seconds, solid contact times up to 300 seconds will be constructed. An automatic SESC apparatus will be constructued. The results will be analyzed and optimum operating conditions projected for commercial operation. Liquid yields of 20 percent (carbon conversion) were observed at 890°C in 750 psia steam, 2 minute solid contact time, and 4 second vapor residence time. The mean molecular weight of liquid product decreases with increasing reaction temperature. Nitrogen content of liquid product decreases with increasing temperature. Temperature range 850° to 950°C is targeted as optimum for light liquids of low heteroatom content. The cost of gasification will be reduced by the simultaneous production of high-value liquid products. The process is more complex than gasification alone so process development will be required.

19453 (DOE/METC—82-51, pp 93-96) **Flash pyrolysis of coal with reactive and nonreactive gases.** Steinberg, M.; Fallon, P. (Brookhaven National Lab., Upton, NY). Sep 1982. NTIS, PC A10/MF A01.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

Although there is a considerable literature on pyrolysis, information on the flash pyrolysis of coal with various gases under comparative conditions is less consistent. A good deal of information has been developed in the program on the rapid hydrogenation or flash hydropyrolysis of coal. It has become well known that the rapid hydrogenation (flash hydropyrolysis) of coal at higher temperatures produces significantly higher yields of lighter hydrocarbon liquids and gases. Much information has become available from flash hydropyrolysis data developed at BNL that indicates dramatic increases in methane and ethane yields and in BTX and light liquid oil yields. The purpose of the present work is to conduct a systematic study to determine the physical and chemical effects of the rapid heat-up and reaction of coal with inert gases (He, N_2, and Ar) and with other reactive gases (CH_4, CO, CO_2, and H_2O) in an entrained flow reactor. The operating conditions can range from atmospheric to 270 atmospheres, temperatures from room to 1000°C, coal flow rates from 0.10 to 4 lbs/hr, and gas flow rates from 0 to 20 lbs/hr. The advantage of flash pyrolysis as a process tool is to obtain higher yields and more valuable products by a direct conversion technique. The thermodynamic efficiency of direct flash pyrolysis is higher than by indirect conversion, which involves producing CO and H_2 first and then catalytically correcting to products. There is a potential that coal flash pyrolysis can produce valuable liquids and gases and the char be utilized to produce power for the utilities. Many US utilities, oil companies, and chemical companies have shown interest in the data that is being produced. There is also interest in foreign countries.

19454 (DOE/METC—82-51, pp 100-108) **Coal gasification support studies.** Babu, S.P. (IGT, Chicago, IL). Sep 1982. NTIS, PC A10/MF A01. Contract AC21-80MC14705.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

The objective of this program is to advance coal gasification technology through a series of related studies that support the development of advanced coal gasification processes. These studies, involving both the analytical and experimental aspects of synfuels production, will contribute to fundamental understanding of reaction mechanism and pertinent unit operations, generate missing basic design data, and develop new processing techniques for direct application to overall processes. Several of these studies, including gasification kinetics, gas solids fluidization, and evaluation of shift catalysis were initiated with AGA/GRI support. Highly sophisticated experimental setups, having a replacement value of over $4 million, were made available to the ERDA/DOE program in April 1978. The initial DOE program addressed research in coal conversion reactions, fluidization, gas and effluent upgrading, and coal preparation. The scope of the present program is reduced to fluidization and gas and effluent cleaning and upgrading studies. Although much is known about commercially existing, first-generation processes, they can be made more efficient, reliable, and economical by the generation of new information. Coal conversion development beyond the first-generation technology involves temperature, pressure, and mode-of-contact variables, which are different enough from current commercial technology that new information on the fundamental reaction mechanisms and reactant contacting modes and new design and engineering data and processing techniques must be developed experimentally under conditions simulating actual plant operation. The present support studies have produced results that are widely applicable to high-BTU gasification, medium-BTU, and low-BTU gasification, synthesis gas production, fluidized-bed combustion, and coal liquefaction.

19455 (DOE/METC—82-51, pp 112-115) **Stochastic study of local fluctuations around the distributor in a fluidized-bed gasifier.** Fan, L.T. (Kansas State Univ., Manhattan). Sep 1982. NTIS, PC A10/MF A01. Contract AC21-81MC16310.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

The investigation involves the following four tasks: measuring local properties of the fluidized bed, including pressure, differential pressure, particle velocity, bed composition, bed capacitance and/or temperature around the distributor of the fluidized bed, and computing auto-correlation functions of their fluctuations, under steady-state and unsteady-state conditions; cross-correlating between any pair of fluctuating state variables, e.g., between pressure and particle velocity; modeling several stochastic features around the distributor of a fluidized bed, including temporal fluctuations and spatial variations of pressure, particle velocity, bed composition, bed density, and/or temperature; testing the feasibility of employing the techniques and models developed in this work as diagnostic tools for malfunctions of a fluidized-bed gasifier, especially its gas distributor, and for establishing static and dynamic control schemes for the gasifier. A substantial number of experimental data have been obtained. The data include the local voidage and local pressure and their fluctuations in a fluidized bed, especially around the distributor plate. The data have yielded some important information, such as the jet height variations, the bed density distribution, the bubbling frequency distribution, and the cause of the pressure fluctuations. The on-line measurement and data processing, using statistical correlation functions, have been found to be efficient with respect to computational effort and to give sufficiently accurate results; however, the costs for the required facilities are substantial, and furthermore, the data can be interpreted in a meaningful way by highly trained personnel.

19456 (DOE/METC—82-51, pp 116-120) **Hydrodynamical basis for scaling fluidization data on jet penetration and mixing relevant to fluidized-bed coal gasifiers.** Blake, T.R. (Univ. of Massachusetts, Amherst). Sep 1982. NTIS, PC A10/MF A01. Contract AC21-81MC16440.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

A major uncertainty in the design of fluidized-bed reactors for coal conversion is the applicability of existing hot or cold fluidization data to a new fluidization environment. Consequently, the modification of a current design, such as scale-up, or the development of new configuration either requires extensive experimental investigation or an uncertain extrapolation of the existing data base. With the possibility of major scale-up decisions regarding fluidized-bed gasifiers such as the Westinghouse Agglomerating Combustor/Gasifier and the Institute of Gas Technology U-Gas Gasifier, it is timely to review, compile, and correlate fluidization data relevant to such gasifier concepts. There are two major purposes to such research. The first is to examine and review fluidization data that are relevant to the environment of fluidized-bed coal gasification reactors. A particular emphasis will be placed upon jet penetration and bubble formation. The second purpose is to critically review existing correlations and, based upon theoretical models of fluidization, establish nondimensional parameters that can be used to scale fluidization data. In this theoretical study, models of gas fluidized beds using two-phase theories, continuum mixture theories, and discrete representations of the gas-solids flows will be examined, and nondimensional groups associated with these formulations will be applied in the correlation of the data. An additional benefit would be the assessment of theoretical models in providing a representation of fluidization phenomena. This is of considerable interest, since there is an increasing application of complex hydrodynamic models to study fluidization.

19457 (DOE/METC—82-51, pp 121-123) **Evaluation of mechanistic models for coal gasification.** Padhye, A.R. (West Virginia Univ., Morgantown). Sep 1982. NTIS, PC A10/MF A01.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

The prime objective of this contreact is to evaluate three computer simulation models of fluidizd-bed and entrained gasification ractors. The models to be tested are CHEMFLUB of System, Science and Software (SSS) and FLAG and FLAME of JAYCOR. The models are to be tested for the soundness of their mathematical basis and numerical methods, accuracy of coding, and appropriateness of the several constitutive relations used in the models. Also, the codes are to be exercised to simulate experimental situations and results. Presently, several computer codes based on first principle models for simulations of fluidized-bed and entrained gasifiers are under development. These codes stand at a stage where they are to be validated so as to identify merits and demerits of each of the models, and to formulate guidelines for their future developments. Exploratory work in this direction was conducted at West Virginia University under the sponsorship of METC. The present contract is for continuation of that work in a more rigorous fashion. There are three major physical aspects of a gasifier: hydrodynamics, heat transfer, and chemistry. This task will appraise the appropriateness of the mathematical formulations used for modeling these phenomena in various models.

19458 (DOE/METC—82-51, pp 124-126) **Fluidized-bed gasifier - systems model development.** Bloomfield, D. (Physical Sciences, Inc., Woburn, MA). Sep 1982. NTIS, PC A10/MF A01. Contract AC21-80MC14361.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

Using existing laboratory data PSI is developing the appropriate modifications to the PSI FBG code to make the model treat slugging beds accurately. PSI is also constructing the data tables that will be used by the systems model. PSI identified the parameters that are important for the slugging regime and is in the process of incorporating them into the PSI model. It is found that neither bubble size nor flow type in the emulsion phase have a significant effect on the char conversion. The parameter that does have an effect on conversion is the tranfer coefficient between bubble and emulsion phase. Slugging occurs when the ratio of bed height to bed diameter is large. Since this is the case for many gasifiers, modifying the present PSI FBG code to include slugging conditions has a great advantage. It can predict the behavior of gasifiers operating in slugging regime more accurately. In generating a systems model that is based on the output of the detailed model of the fluidized-bed gasifier, PSI will develop the capability of accurately assessing the operation of the gasifier in a systems environment. This is, perhaps, the most important feature of the program. It gives the systems designer a tool with which he can optimize the system configuration and component design. Because the systems model is based on the output of the detailed code, the analyst can have confidence that the operation of the gasifier in a systems environment is accuratly simulated.

19459 (DOE/METC—82-51, pp 127-130) **Prediction and measurement of operating parameters for entrained-flow coal gasification processes.** Smoot, L.D. (Brigham Young Univ., Provo, UT). Sep 1982. NTIS, PC A10/MF A01. Contract AC21-81MC16518.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

The laboratory-scale, entrained-coal gasifier was designed, constructed, and used to make atmospheric coal gasification measurements. Gasifier tests to determine optimum operating conditions and to obtain detailed maps of local gas and particle composition and mass flux data from inside the gasifier were completed. Variables investigated have included steam/oxygen/coal ratios, coal particle size, gasifier injector configuration, preheat temperature, secondary/primary mass flow, and velocity ratios and the partitioning of the O_2 between secondary and primary jets. One-dimensional and two-dimensional entrained-coal gasifier computer models were also completed, and model predictions were compared with laboratory measurements. Further, cold-flow jet mixing experiments were completed. These non-reactive jet mixing tests were designed to provide fluid property measurements to support model developmnt and validation. This study of details of physical and chemical processes taking place inside an entrained gasifier is thought to be unique. A well-equipped laboratory, a functional gasifier, a combined theoretical and experimental approach, a combined study of carbon conversion and pollutant formation, and a supporting cold flow study have been available and usd in the work. Also, the study has been closely associated with a companion EPRI contract for pulverized coal combustion, which has reduced the cost of cold flow tests and model development. Costs are further reduced through BYU cost sharing (13 percent). The results will provide a more compelte understanding of the physical and chemical processes involved in entrained coal gasification.

19460 (DOE/METC—82-51, pp 131-136) **Coal gasification reactions with on-line, in-situ FT-IR analysis.** Solomon, P.R. (Advanced Fuel Research, Inc., East Hartford, CT). Sep 1982. NTIS, PC A10/MF A01. Contract AC21-81FE05122.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

This work has developed an important understanding of the thermal decomposition of coal that was incorporated into a successful general kinetic model. The model allows the prediction of time- and temperature-dependent evolution of pyrolysis products from a knowledge of the coal's functional group distribution using a set of kinetic rate constants that are independent of coal rank. The current program will extend these results to coal pyrolysis under practical gasification conditions. Standard tests such as proximate analysis and free swelling index are of limited value since they are usually made under conditions much different from those encountered in an actual reactor. This program will obtain data in an entrained flow reactor under practial gasifier conditions and use the data to develop a general model for coal pyrolysis. The reactor has been designed to study coal behavior under temperature and heating rate conditions encountered in an entrained flow gasifier. After a variable residence time, the reacting stream passes optical access ports and is quenched immediately downstream in a water-cooled collector. The clean gas stream enters the room temperature FT-IR cell that provides a longer path length for higher sensitivity analysis.

19461 (DOE/METC—82-51, pp 137-138) **Theoretical and experimental studies of fixed-bed coal gasification reactors.** Joseph, B. (Washington Univ., St. Louis, MO). Sep 1982. NTIS, PC A10/MF A01. Contract FG22-80PC30219.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

The objective of this research is to develop mathematical models to describe the steady-state and dynamic behavior of fixed-bed coal gasification reactors. Under the previous grant, a computer program capable of predicting short-term and long-term transients in Lurgi-type gasifiers was developed and tested. However, it was not possible to fully validate the model using data available in the literature. Furthermore, it was necessary to incorporate a large number of simplifying assumptions in the model. The purpose of the current project is to partially remedy this situation. The key problem area in validating the model is to obtain reproducible, reliable data. A laboratory fixed-bed gasifier has been designed to accomplish this. Selected samples of coal will be gasified in a tubular reactor. The temperature profiles and the product gas composition will be monitored as a function of time. Preliminary runs will be concentrated on identifying key model parameters and verifying critical assumptions in the model. The existing dynamic model will be modified to simulate the experimental reactor. The model will be upgraded by removing some of the simplifying assumptions and incorporating short-term dynamic effects.

19462 (DOE/METC—82-51, pp 139-143) **Development of a process for the simultaneous high-temperature removal of alkali and particulates in pressurized gasification systems.** Mulik, P.R. (Westinghouse Electric Corp., Pittsburgh, PA). Sep 1982. NTIS, PC A10/MF A01. Contract AC21-81MC16372.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

Hot gas cleanup systems, if developed, have the potential to remove contaminants from the fuel gas without any significant cooling. As such, the heat rate improvement advantage for hot gas cleanup over cold gas cleanup is estimated to be about 500 to 600 BTU/kWh for combustion turbine inlet temperatures of about 2000° to 2200°F. At the same time, hot gas cleaning circumvents problems associated with heat recovery in coal cleaning systems. For example, constituents of the fuel gas, such as soot, ash, and other particulates, along with any tars that may be present, could produce deposits on heat exchange surfaces. In an operating system, the performance spread could be greater than the 500 to 600 BTU/kWh indicated above. The experimental and analytical investigations, preliminary systems design, and cost estimates completed under this program demonstrated the feasibility of utilizing aluminosilicate-basd getters for controlling alkali in pressurized gasification systems. On this basis, this work was extended to the current contract, facilitating the resolution of several questions raised during the completed program regarding alkali getter selection and application. The limited rate, capacity, and other problems (primarily potassium relase) associated with a number of getters tested initially have been cause for concern. While systems based on these getters are feasible, the economics associated with their implementation indicate that an improvement in alkali capacity is desirable. The results of preliminary screening and TGA tests on several new candidate getters are encouraging. They indicate a substantial improvement in capacity that, if verified in additional studies, will establish gettering via aluminosilicates as a viable hot gas cleaning process.

19463 (DOE/METC—82-51, pp 144-148) **Feasibility study of hypersorption process for separation of components of a medium-btu gas.** Saroff, L. (Dravo Engineers and Constructors, Pittsburgh, PA). Sep 1982. NTIS, PC A10/MF A01. Contract AC21-81MC16447.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

A general description of a hypersorption process is given. Activated carbon is fed to the top of the hypersorber through 12-inch dense phase transport lines. Four bins receive the activated carbon. Circulaton rates for the activated carbon are based on the rates and compositions of the expected bottom product assuming adsorption equilibrium of an ideal mixture. A recirculating top product gas stream is fed to the bins to cool the carbon to the adsorption temperature. Tower diameters are such that the gas velocity will not exceed 80 percent of the fluidization velocity. Desoprtion temperatures were chosen to leave approximately 10 percent of the bottom product on the adsorbent. Higher temperatures could be used to achieve a higher percentage of desorption of the gas adsorbed but would be less economical. Desorption is accomplished by establishing a recycle heat loop for the bottom product. Direct heating of the activated carbon serves as the desorption section of the hypersorber. This method of desorption is considered to be more economical than using heat exchanger with the towers to indirectly heat the activated carbon for desorption and to cool the adsorbent before entering th adsorption section. In general, total installed and operating cost of the hypersorption plant is higher than the cryogenic facility. These are not significant considering the nature of the cost study. However, the installed cost of the separation and purification of the cryogenic portion of the plant is greater than the hypersorbers. The economic evaluation does not present a clear cut test of which system is better. Further work on hypersorption processing for multicomponent system would be useful to eliminate the technological risks of applying hypersorption process technology.

19464 (DOE/METC—82-51, pp 149-153) **Low energy process for separating hydrogen and methane in advanced coal gasification processes.** Yang, R.T. (State Univ. of New York, Buffalo). Sep 1982. NTIS, PC A10/MF A01. Contract AC21-80MC14386.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

Two of the major and costly units of operation in the production of high-BTU gas from coal are separation of H_2 and CH_4 and cleanup of the acidic pollutants, i.e., about 1 percent H_2S is usually contained in coal gases. In the present designs, cryogenic separation and wet scrubbing processes are being contemplated. Besides their high energy requirements, the cryogenic processes are thought undesirable because a high purity of CH_4 is not required for high-BTU gas production. In this program, fixed-bed, cyclic processes are being developed for producing a fuel gas containing about 90 percent CH_4. The program is also aimed at the ambitious goal of developing a combined CH_4/H_2 separation and H_2S cleanup process. A complete data base of adsorption isotherms for the $CH_4/H_2/H_2S$ system (single and mixed gases) on activated carbon, Pittsburgh bituminous coal and coke, and Montana lignite and char, are being established. Separation of 50/50 CH_4/H_2 into 90/10 streams with a continuous feed has been routinely attained using PCB carbon and Montana char (lignite carbonized at 800°C in N_2), by temperature swing. The temperature levels are 22 and 180° to 1250°C. The pressure is in the range of 300 to 800 psig. A pore-diffusion model has been established that can (1) predict the performance of fixed-bed, cyclic separation processes and (2) be used as a guide in selecting the adsorbent. The cyclic fixed-bed separation process, using the coal sorbent developed in this work, would be a lower-cost process and require less energy than the present cryogenic processes. The combined separation/cleanup process could combine two process steps into one for advanced coal gasification.

19465 (DOE/METC—82-51, pp 154-157) **Calcium silicate cement sorbent for H_2S removal and improved coal gasification processes.** Steinberg, M. (Brookhaven National Lab., Upton, NY). Sep 1982. NTIS, PC A10/MF A01.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

In situ high temperature removal of H_2S and COS produced in fluidized-bed coal gasifier systems is a desirable objective in hot gas cleanup of fuel gases. Work performed with Agglomerated Cement Sorbent (ACS) in the laboratory established that this sorbent has good physical and chemical stability and capacity for SO_2 removal from hot combustion gas mixtures. The mechanism for H_2S absorption, like SO_2, can be expected to result in diffusion controlled kinetics with sorption capacity dependent on the porosity of the solid sorbent. In the case of Ca-based sorbents, such as Portland cement Type III (CaO content of 63.3 percent), the smaller molar volume of CaS in comparison with $CaSO_4$, can, at least in principle, lead to 100 percent utilization of the active ingredient. However, the practical consideration of the kinetic rate for H_2S removal determines the effective utilization limit for these sorbents. A literature review led to the conclusion that the first-order rate constant for H_2S or SO_2 removal are probably not very different. Both TGA and bench-scale experiments on sorbent reactivity for H_2S removal indicate that ACS pellets result in significant improvements in sulfur removal from fuel gases compared to Greer limestone. These ACS pellets can be made to any size and are much superior to limestone in resistance to attrition. TGA and bench-scale FBG tests also indicat that the sorbent can have a strong influence on the gasification efficiency of coal and coal char and that the ACS pellet is superior to Greer limestone in enhancing the gasification efficiency of coal. In addition to sulfur removal, the improved gasification of coal to fuel gas by a possible surface catalytic mechanism is a decided advantage over conventional operation of fluidized-bed gasifiers.

19466 (DOE/METC—82-51, pp 158-163) **Acid gas removal process.** Massey, L.G. (CNG Research Co., Cleveland, OH). Sep 1982. NTIS, PC A10/MF A01. Contract AC21-80MC14399.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

The crude fuel gas is first dehydrated and then cooled to its dew point. Further cooling to -55°C condenses carbon dioxide. The gas at -55°C is scrubbed clean of sulfur compounds and remaining trace contaminants with liquid carbon dioxide. Liquid carbon dioxide has several desirable properties as an absorbent: it absorbs COS more effectively than H_2S; its low viscosity promotes high absorber stage efficiency; it is a relatively dense fluid with low molecular weight that enhances gas solubility per unit volume of solvent; and it is available from the gas stream being treated. Liquid carbon dioxide absorbent, with sulfur compounds and other trace contaminants, is combined with the sulfur-contaminated liquid carbon dioxide stream, typically 3 to 5 mole percent hydrogen sulfide, is sent to the carbon dioxide regenerator. The sulfur-free gas leaves the sulfur absorber at essentially -55°C with carbon dioxide the only significant impurity yet to be removed. Pure carbon dioxide is regenerated by triple point crystallization in a continuous separation cascade similar to continuous distillation. Further carbon dioxide is removed from the main gas stream at temperatures below the carbon dioxide triple point temperature by absorption into a slurry consisting of a liquid solvent saturated with carbon dioxide and containing solid carbon dioxide. The preferred solvents for slurry absorption are oxygenated organic compounds such as ketones: they possess low freezing points, low viscosity when saturated with solid carbon dioxide, low vapor pressure, and high solubility for solid carbon dioxide.

19467 (DOE/METC—82-51, pp 164-166) **Thermal reactions of aromatics with CaO.** Longwell, J.P.; Williams, G.C.; Peters, W.A. (Massachusetts Inst. of Tech., Cambridge). Sep 1982. NTIS, PC A10/MF A01. Contract FG22-80PC30229.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

Previous research at MIT has shown that (a) fluidized-bed pyrolysis of coal in the presence of calcium oxide decreases absolute tar yields but generates tars of lower oxygen content and higher H/C ratio and also results in major desulfurizaton of the pyrolysis gas including removal of thiophenic compounds; (b) calcium oxide exhibits significant cracking activity for pure aromatic compounds such as benzene and for heteroatom-containing aromatics such as thiophene, pyrrole, and furan and accelerates the cracking rate of aromatics to a much greater extent than for aliphatic compounds; and (c) packed tube pyrolysis of coal in the presence of calcium oxide produces tars of significantly lower mutagenic potency than those obtained under similar conditions using sand. An improved reactor facility has been constructed and systematic studies of the effects of calcining conditions on CaO cracking activity for pure aromatics are well underway. Future work will focus on: (a) completion of the study of calcination chemistry to determine the effects of other calcining variables on the activity of CaO; (b) systematic studies of the effect of temperature on the conversion reactions of higher boiling polycyclic aromatic compounds over CaO and quartz; and (c) studies of the surface activity of CaO as a function of temperature and possibly methods of stone preparation.

19468 (DOE/METC—82-51, pp 168-171) **Coal gasification and tar conversion reactions over calcium oxide.** Longwell, J.P.; Peters, W.A. (Massachusetts Inst. of Tech., Cambridge). Sep 1982. NTIS, PC A10/MF A01. Contract AC21-81MC16026.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

Previous research at MIT has shown that (1) fluidized-bed pyrolysis of coal in the presence of calcium oxide rather than sand at 700 K-1033 K resulted in (a) major decarbonation of the product gas over the temperature range 700 K-923 K, (b) virtually total desulfurization of the product gas, (c) increased heating value per unit volume of product gas, (d) greater proportion of the coal heat content converted to pyrolysis gas, and (e) decreased absolute tar yields but product tars of higher H/C ratio and lower oxygen content (effects (c) to (e) apparently result from an unexpected ability of calcium oxide to augment the thermal cracking reactions of coal pyrolysis tars); (2) calcium oxide accelerates preferentially the cracking rate of pure aromatic compounds to a much greater extent than that of pure aliphatic compounds; and (3) exploratory experiments on packed bed pyrolysis of coal in the presence of calcium oxide produce tars of significantly reduced mutagenic potency to bacterial cells. Using a reactor system designed to allow the cracking of freshly formed coal pyrolysis tars over calcium oxide to be studied in a controlled, systematic fashion, the independent effects of temperature, pressure, gaseous atmosphere, and residence time on total conversion, product yields, compositions, and global formation kinetics will be studied over ranges pertinent to coal gasification. The experimental approach is based on controlling the extent of contacting of freshly formed pyrolysis tars with a packed bed of calcium oxide or other stone of well known calcination history and surface properties.

19469 (DOE/METC—82-51, pp 172-175) **Thermal and catalytic cracking of tars and tar constituents from coal gasification processes.** Wen, W.Y. (Clark Univ., Worcester, MA). Sep 1982. NTIS, PC A10/MF A01. Contract AC21-80MC14385.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

Tars produced by incomplete gasification of coal can account for as much as 6 weight percent of carbon on bituminous coal fed to fixed-bed gasifiers. These tars can cause fouling or corrosion of heat recuperators, lockhopper ball valves, and other surfaces; can interfere with wet chemical removal techniques for other contaminants; and can present a potential carcinogenic threat if released. When the raw gas is quenched, it yields an aqueous condensate stream saturated with aromatic compounds. In some cases it may contain emulsified tars and oils. The cost of equipment neccessary for treatment of the wastewater in a Lurgi high-BTU gasification plant is, at least, 8 percent of the total capital investment. Thermal cracking step is the key stage in elimination of tars from gasifier products. With proper design and operation of a gasifier, it should be possible to enhance thermal cracking of tars; the performance of many gasifiers would likely be improved when suitable catalysts are introduced. It was found that: tar cracking is insignificant at temperatures below 600°C; calcium oxide and fire bricks are relatively effective catalysts for tar cracking; chars also act as catalyst for tar cracking, though not as effective as calcium oxide or fire bricks; but clay minerals (aluminosilicates) generally considered to be catalysts for cracking reactions are not genuine catalysts; they function rather as steam and oxygen suppliers during the reaction.

19470 (DOE/METC—82-51, pp 176-180) **Pollution control in coal gasification.** McMichael, W.J. (Research Triangle Inst., Research Triangle Park, NC). Sep 1982. NTIS, PC A10/MF A01. Contract AC21-81MC16441.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

Temperature and pressure conditions of the raw gas and condensate produced in coal gasification make two processes look technically attractive for control of undesirable components. These processs are (a) vapor phase cracking of undersirable components prior to quenching the raw gas and (b) wet oxidation of the condensate. To investigate these control techniques, the Research Triangle Institute (RTI) carried out a preliminary experimental program. Cracking studies were performed in small benchscale equipment (microreactors), and the wet oxidation expriments were carried out in a continuous flow stirred tank reactor. The significant accomplishments to date include (a) construction of a high-pressure and temperature gas/solid/liquid mixing and reaction system for carrying out reactions at coal gasifier exit conditions, (b) demonstration of the inadequacy of using iron-containing catalysts and coal char (below 650°C) for vapor phase cracking, (c) demonstration of the potential of using sulfided cobalt molybdate catalysts for cracking of phenol under practical gasifier exit conditions, and (d) selection of the best commercial catalyst materials and coal chars for wet oxidation of actual gasifier wastewater. A successful vapor phase cracking process would have advantages over the traditional quench-then-treat approach since eliminating heavy organics from the raw gas at high temperature would reduce operational problems downstream of the gasifier, permit the recovery of high quality waste heat, and reduce the cost of condensate cleanup for reuse in the gasification process. Wet oxidation is currently usd as an industrial waste treatment method in a number of installations around the world and favorable conditions for its use can be obtained easily in gasification process.

19471 (DOE/METC—82-51, pp 186-187) **Operation of wastewater treatment PDU and PTPA 643 cooling tower simulation.** Willson, W. (Grand Forks Energy Tech. Center, ND). Sep 1982. NTIS, PC A10/MF A01.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

The Great Plains Gasification Association (GPGA) proposes to treat gasification wastewater minimally before disposal in a cooling tower. Pretreatment will consist of tar water separation, phenol extraction, and ammonia stripping. GPGA does not anticipate biological treating. According to American Natural Resources, sponsor of the GPGA project, the major area of uncertainty where research activities should be focused centers on the cooling tower. The extent of wastewater treatment needed to produce a satisfactory feed to the cooling tower is unknown, and the environmental and economic risks are substantial. Feeding water directly from the extraction/stripping units to the cooling tower, without intermediate biological treatment, is most cost effective. However, this wastewater after phenolics and other organics are reduced to low levels, still contains several thousand mg/1 of COD. The behavior of these as yet uncharacterized contaminants in a cooling tower with respect to drift, biological activity, and associated heat transfer surface fouling, is unknown. The use of a wastewater treatment system of sufficient size to prepare quantities of water for subsequent cooling tower studies has been obtained from the Environmental Protection Agency. The units, which were installed at the Holston Army Ammunition Plant in Kingsport, Tennessee, include solvent extraction, free- and fixed-leg ammonia stripping, and an aerated activated sludge unit. Wastewater pretreatment for preparing feed to the cooling tower during the initial test will consist of solvent extraction and free- and fixed-leg ammonia stripping. Sufficient wastewater will be prepared to ensure a minimum of 200 hours of cooling tower operation.

19472 **(DOE/METC/TPR—83-43) Hydrocarbon content of the vapor phase and light-oil fraction in the output stream of the METC gasifier.** Lamey, S.C.; Kovach, J.J.; Childers, E.E. (USDOE Morgantown Energy Technology Center, WV). Jan 1983. 26p. NTIS, PC A03/MF A01. Order Number DE83005868.

The higher molecular weight hydrocarbons contained in the clean low-Btu gas are primarily benzenes and naphthalenes with some furans and thiophenes. While analysis of the data shows that loadings range from 1-10 g/scm, the data are subject to variability introduced both in the process itself and in the sampling methods. Qualitatively, for the higher molecular weight hydrocarbons, collection on Tenax at atmospheric or gas stream pressure gives similar compounds, although the distribution is different. Comparison of the pressurized Tenax, atmospheric Tenax, and the drip leg sample shows a decreasing amount of lower molecular weight components. This is due primarily to the collection method. In the latter two samples the pressure reduction can result in the loss of the lighter weight hydrocarbons that could be retained in the pressurized sample. It appears that, qualitatively, typical compounds in the gasifier stream have been identified. Quantitatively, additional studies need to be conducted to evaluate Tenax as a collection medium for pressure applications including the pressure dependency of its collection efficiency. It does appear that the pressurized collection of material using Tenax and the subsequent analysis by capillary GC/MS and headspace gas chromatography of the collected samples is a viable approach to acquisition of base line data for in situ hydrocarbon measurement system development.

19473 **(DOE/NBM—3008234) On-line material balance for the 10-tpd SYNTHOIL PDU: software procedures.** Fuchs, W. (Energy Research and Development Administration, Pittsburgh, PA (USA). Pittsburgh Energy Research Center). [nd]. 66p. NTIS, PC A04/MF A01. Order Number DE83008234.

A proper evaluation of the SYNTHOIL PDU and its performance requires the accountability of all materials entering and leaving the system. This is also true for all forms of energy. Extensive procedures to establish mass and energy balances for the 10 TPD plant are being developed. These balances, in conjunction with the data acquisition and data logging system, will provide the major portion of the information needed for the evaluation of the process and of the plant operation. In addition, alarm conditions will be reported instantly, and a permanent record of the plant history and its operations will be maintained. This document describes the procedure for the on-line material balance and for the reporting routines. These programs are intended to run in parallel with all other computer function (e.g. data logging, alarm check, etc.). However, where applicable, data logs may be used for the material balance. On-line material balances are determined on a regular periodic basis (cycle time 1 to 2 hours), and one full run contain the balances of the total mass and of the components listed. The plant is divided into 10 subunits which can be balanced individually. These subunits are outlined by heavy dashed lines in Figure 2-1. The graphical representation of this system consists of 10 nodes (numbered 1 to 10) and 35 streams connecting the nodes with each other and with the outside world.

19474 **(DOE/OR/03054—9) SRC-I quarterly technical report, July-September 1982.** (International Coal Refining Co., Allentown, PA (USA)). Mar 1983. Contract AC05-78OR03054. 474p. NTIS, PC A20/MF A01. Order Number DE83007989.

Fourteen research studies conducted for the SRC-I coal liquefaction demonstration plant near Newman, Daviess County, Kentucky, have been entered individually into EDB and ERA. (LTN)

19475 (DOE/OR/03054—9, pp 1-24) **General-purpose transportation and storage simulator for the SRC-I Demonstration Plant.** Patnaude, L.G. (International Coal Refining Co., Allentown, PA); Valenzuela, C.A. Mar 1983. NTIS, PC A20/MF A01.

In SRC-I quarterly technical report, July-September 1982.

Designing some components of a new plant, such as the storage tanks, loading stations, and intra-plant rail systems, is difficult, but these areas are frequently the major source of problems after the plant becomes operational. The following factors hinder design: Storage and distribution are part of a complex system that handles incoming customer orders as well as delivery of end products. Interactions within the system are so diverse that simple analytical models cannot solve problems accurately. Frequently, components of such a system have been sized as if they were independent entities, which may not be the case. For example, storage tanks, sized by a project engineer, and a rail fleet of tank cars, sized by a distribution specialist, are not mutually exclusive entities; tank cars often serve as secondary storage. Many of the system variables may be stochastic, nonlinear, or time dependent. Under such conditions, mathematical analysis tends to break down. Consequently, design is usually based on rule-of-thumb predictions. Such generalized techniques may not work well for the plant system under study. Aware of these difficulties, ICRC decided that the size and complexity of the SRC-I plant warranted development of a simulation model. Human analysis of these interactions is impossible, but computer simulation can address numerous hypothetical situations and resolve problems during the design stage. ICRC and APCI have developed a computer simulation model of the SRC-I Demonstration Plant storage and transportation system. The model enables ICRC to analyze the demonstration plant as an integrated production, storage, and distribution system. Furthermore, the simulation is flexible, so a variety of experiments can be performed to analyze the effects of modifying selected design parameters, or to identify and resolve potential design problems.

19476 (DOE/OR/03054—9, pp 25-44) **Selection of process dynamic simulation software for control strategy analyses.** Fairchild, B.T. (International Coal Refining Co., Allentown, PA). Mar 1983. NTIS, PC A20/MF A01.

In SRC-I quarterly technical report, July-September 1982.

ICRC is searching for digital computer software that can be used as a tool in dynamic simulation investigations of control strategies for the SRC-I Demonstration Plant. This report traces the development of dynamic process simulators and identifies important features that must be evaluated during the selection process. Of several simulators identified, three that are in the public domain and two proprietary simulators available on a contract basis warrant further investigation. Thus far, steady-state process simulators have been evaluated; Schmidt et al. (1982) concluded that the Advanced System for Process Engineering (ASPEN) should be upgraded to provide a suitable simulator for the SRC-I plant. Progress in selecting a dynamic simulator is less well-developed. Dynamic simulation of process plants has several aspects that, in combination, set this type of modeling apart from studies in other areas of science and engineering. Process plants have many unit operations that are coupled through process piping, stream recycles, heat integration, and control loops. The process streams may contain multiple chemical components. Common equipment such as unit operations, process piping circuits, and control systems are often replicated within a process plant. Although certain features are the same for both steady-state and dynamic simulation of a chemical process, the key feature of a dynamic simulation program is its ability to track plant variables throughout operational transients. Certain features, some of which are unavailable in general-purpose CSSLs, are grouped together to create general-purpose process dynamic simulators that are especially convenient for use by chemical process engineers.

19477 (DOE/OR/03054—9, pp 45-62) **Laboratory examination of the suitability of three US coal samples or Gesellschaft fuer Kohle-Technologie (GKT) gasification.** Firnhaber, B. (Gesellschaft fuer Kohle-Technologie, Essen, Germany). Mar 1983. NTIS, PC A20/MF A01.

In SRC-I quarterly technical report, July-September 1982.

ICRC has licensed the GKT coal gasification process for gasifying coal liquefaction residue and producing hydrogen. Supplemental coal will be gasified in addition to the liquefaction residue. Therefore, to assess the suitability of various coals as potential feedstocks to the gasifier, ICRC sent three samples of Eastern US bituminous coals to GKT for laboratory analysis. Two of the coals, Indiana No. 3 and Illinois No. 6, appear well-suited for entrained-bed gasification. They have high volatile contents, good reactivity, and favorable ash properties. The third coal, Ohio No. 6A, also contains many volatiles, but appears to be less suitable because its ash has a high base-to-acid ratio due to the coal's high iron content. However, in spite of this drawback, the Ohio coal can probably be used for blending with other coals or liquefaction residues, since its ash content is very low (6.5 wt % moisture-free).

19478 (DOE/OR/03054—9, pp 63-71) **Baseline flare system design for the SRC-I demonstration plant.** Gunardson, H.H.; Dluzniewski, J.H. (International Coal Refining Co., Allentown, PA). Mar 1983. NTIS, PC A20/MF A01.

In SRC-I quarterly technical report, July-September 1982.

The SRC-I flare system is primarily a safety system capable of relieving the non-steady-state accumulation of material within process equipment and of disposing it safely and efficiently to ensure the protection of life and property. The system is sized to handle the amount of material that must be released under the worst combination of anticipated emergency conditions. The flare system is also capable of safety disposing material released during less serious emergencies, including localized equipment failures and operating errors, and during start-ups and shutdowns. In all emergency situations, the principal purpose of the system is to rapidly release vapor generated within the process equipment in order to prevent the buildup of excessive pressure that would lead to catastrophic equipment failure. Even during start-up and shutdown venting, which occurs under planned, controlled conditions, the primary objective is to control pressure within the process. Controlling environmental impact is an important secondary function included in the flare system design. Each time material is released to the flare, it must be either recovered for reprocessing or disposed of in an environmentally acceptable manner. However, distinguishing between the flare system and pollution control equipment is important. The flare system is first and foremost a safety system, designed to prevent catastrophic equipment failure. In addition, the best available control technology has been incorporated to minimize environmental impact during its operation. The system is designed for maximum destruction of objectionable material during localized emergencies and start-up and shutdown (up to about 20% of maximum flare capacity). During major plantwide emergencies that occur less frequently, the level of destruction achieved is still acceptable.

19479 (DOE/OR/03054—9, pp 73-225) **SRC-I high-pressure slurry letdown system study.** Mar 1983. NTIS, PC A20/MF A01.

In SRC-I quarterly technical report, July-September 1982.

The pressure letdown of high-temperature slurries is one of the major problems in coal conversion processes. The Phase 0 design of the SRC-I Demonstration Plant high-pressure letdown system consisted of a single vessel with parallel letdown valves. In February 1981, growing concerns during design led to the issuance of an engineering change proposal, which modified this design to a two-train system. This led to further concerns, and in February 1982, Catalytic, Inc. was directed to perform a detailed study of the slurry letdown system. Catalytic considered six configurations of the high-pressure slurry letdown system, including single- and two-stage letdown, and single- and multi-train designs. A data base on letdown valve design was developed, and these data were incorporated into the design of the various configurations. To assess these designs, Catalytic considered operability, maintainability, and reliability, as well as capital and operating costs. Although the overall economics appeared to favor the tree-train, single-stage scheme, the equally important constraint that capital cost be minimized whenever possible led to the choice of the two-train, single-stage scheme, which is the current design. However, it was recommended that provisions be made for the future addition of a third train, should that be proven appropriate. For future study, areas of concern include valve design details and materials of construction, which cannot be specified at this time, as well as vessel inlet geometry, pressure magnitude, and use of wear-resistant liners in the flash drum.

19480 (DOE/OR/03054—9, pp 227-243) **Solvent screening experiments for SRC-I phenol recovery.** Luthy, R.G. (Carnegie-Mellon Univ., Pittsburgh, PA). Mar 1983. NTIS, PC A20/MF A01.

In SRC-I quarterly technical report, July-September 1982.

This report summarizes the results of a series of tests that assessed the solvent extraction characteristics of SRC-I process wastewater. The tests were designed to evaluate extraction characteristics of three solvents used on SRC-I wastewater, to determine whether phenols can be recovered effectively, and to provide information for evaluating the economic feasibility of phenol recovery. The preliminary results reported here suggest that two important issues must be resolved: the effect of pH on solvent extraction and the fate of tar acids during extraction. Nonetheless, the data strongly indicate that solvent extraction is an attractive treatment process for SRC wastewater. Phenolics can be extracted easily from the range of 8000 to about 50 mg/L. TOC can be reduced to one-third of its initial value, and aniline and pyridine can be reduced to less than 1 mg/L. The reduction in TOC and COD that can be achieved by solvent extraction should allow for an approximately proportional decrease in the hydraulic detention time required for biological oxidation of SRC process wastewater (that is, about one-third to one-half of that required to treat nonextracted condensate). In addition, as long as tar acids or other inhibitory substances are removed by solvent extraction, operating a primary biological oxidation reactor in the powdered activated carbon mode may not be necessary. Additional tests are needed to quantitate the degree to which tar acids are removed by extraction at various pH values.

19481 (DOE/OR/03054—9, pp 245-281) **Summary and analysis of SRC-I biological treatent data.** Novak, R.A. (International Coal Refining Co., Allentown, PA). Mar 1983. NTIS, PC A20/MF A01.

In SRC-I quarterly technical report, July-September 1982.

ICRC used the QWIKSTAT statistical package on the Air Products and Chemicals, Inc. (APCI) computer to summarize and analyze biological treatment data obtained during wastewater characterization and treatability studies. The operational data on the two biological and two PACT units were taken between February 26 and June 18, 1982, during which low-phosphate, high-salt wastewater feed was used. Statistical analyses revealed that, excepting a small difference in BOD, the single-basin PACT performs significantly better than does the two-basin biological system. Lower residuals and higher percent removals are achieved. Most significant are improved nitrification and complete ammonia removal in a single basin

19482 (DOE/OR/03054—9, pp 283-300) **Measuring alkenes in SRC-I naphthas.** Parees, D.M. (Air Products and Chemicals, Inc., Allentown, PA). Mar 1983. NTIS, PC A20/MF A01.

In SRC-I quarterly technical report, July-September 1982.

A naphtha sample from the first-stage SRC unit (SRC naphtha) was analyzed for alkene content using capillary column gas chromatography/flame ionization detection (GC/FID) by employing bromination to differentiate alkenes from other compound types, particularly cycloalkanes. Results showed that phenols and nitrogen-containing species are also brominated, and that these reactions interfere with olefin identification. However, despite problems with the method, approximate concentration ranges can be determined. A phenol-free SRC naphtha sample was found to contain about 10.9% alkenes, implying that the original naphtha from which it was derived contained 7.6% alkenes, since the sample weight decreased about 30% after phenol removal. After bases were removed from the sample, however, the alkene concentration fell to 6.1%; this value may be more accurate and indicates that other heteroatomic species are causing interference. The GC/FID results agree well with results from the classical American Society for Testing and Materials (ASTM) paraffin/olefin/naphthene/aromatic (PONA) technique, which indicates the presence of about 7 wt % olefins. Nuclear magnetic resonance spectrometry suffers from interference problems, also, but indicates that the original sample contains about 4.2% alkenes.

19483 (DOE/OR/03054—9, pp 301-348) **SRC-I Demonstration Plant analytical laboratory.** Parees, D.M.; Kamzelski, A.Z. (Air Products and Chemicals, Inc., Allentown, PA). Mar 1983. NTIS, PC A20/MF A01.

In SRC-I quarterly technical report, July-September 1982.

Air Products is conducting a research program to aid in developing the analytical laboratory of the SRC-I Demonstration Plant. New gas chromatographic capillary columns and optimized conditions were investigated to increase compound resolution, decrease compound discrimination in the injection port, and achieve maximum precision of injection. The effects of different columns and chromatographs on response factors and area integration precision, as well as the effects of sample matrix on retention times were examined. Although changes in retention time due to the use of different columns or chromatographs might be expected, changes caused by the matrix were not. Such changes complicate the task of assigning peak identities without mass spectrometry. The response factor studies showed that fused silica columns perform as well as glass capillary columns. Area integration precision was also found to be equal for two integrators if the same column and chromatograph were used. A Chaney adapter on the syringe did improve precision. An SRC-I heavy distillate was examined using a flame ionization detector (FID) and a nitrogen selective detector (NSD). A nitrogen-compound subfraction was also examined by FID, NSD, and gas chromatography/mass spectrometry (GC/MS). The analyses determined some of the major nitrogen-containing compound classes in this subfraction to be benzoquinolines, alkylbenzoquinolines, azafluoranthenes (or azapyrenes), and alkylazafluoranthenes.

19484 (DOE/OR/03054—9, pp 349-393) **Microanalytical procedures.** Klusaritz, M.L.; Moyer, J.D.; Palopoli, S.F.; Tewari, K.C. (Air Products and Chemicals, Inc., Allentown, PA). Mar 1983. NTIS, PC A20/MF A01.

In SRC-I quarterly technical report, July-September 1982.

Effective demonstration plant operation will rely on accurate monitoring of process streams to provide data for process and product quality control, particularly during plant start-up. To ensure that the plant's analytical laboratory will be operating smoothly, various analytical methods are being evaluated and developed. This report discusses microanalytical procedures selected by APCI to determine chlorine in solvent-refined coal (SRC) liquids, sulfur in hydrotreated naphtha, nitrogen in hydrotreated naphtha and SRC-I distillates, and pentane-insoluble matter in SRC solids. Researchers found that the Dohrmann microcoulometric titration system is a reliable and fast procedure for measuring both chlorine and sulfur. However, the Dohrmann system does not provide reliable results for nitrogen; instead, chemiluminescent analysis with an Antek instrument is recommended. A modified version of American Society for Testing Materials (ASTM) method D2317-76 that used pentane rather than toluene and benzene to extract oils was selected for analyzing SRC solids. This report also documents the capsule injection gas chromatographic simulated distillation (SDGC) technique developed by APCI to analyze SRC materials, plus the results of an evaluation of the methods's precision. The reproducibility of residue determinations was found to be 1.6 to 2.1% absolute, and data on boiling-point distribution showed that a cut point can be defined within the range of 0.1 to 1.2% absolute.

19485 (DOE/OR/03054—9, pp 395-419) **LC-Finer catalyst testing.** Garg, D. (International Coal Refining Co., Allentown, PA). Mar 1983. NTIS, PC A20/MF A01.

In SRC-I quarterly technical report, July-September 1982.

ICRC is conducting an ongoing program to develop data that will confirm the choice of Shell 324 nickel-molybdenum (Ni-Mo) catalyst for use in the LC-FINER in the SRC-I Demonstration Plant. The catalyst's activity and aging were studied during hydroprocessing of heavy solvent-refined coal (HSRC) and process solvent from the hydrotreater in a process development unit (PDU). To determine how SRC conversion and catalyst activity varied with time, a constant temperature of 775°F was maintained throughout the PDU run. During the first 25 hr, SRC conversion was 43 to 48% and desulfurization, dinitrogenation, and deoxygenation were 82, 48, and 68%, respectively. SRC conversion, oils production, SRC sulfur content, desulfurization, denitrogenation, deoxygenation, and the first-order rate constant for SRC conversion changed only slightly during the first 294 hr but changed significantly after that. Oils and hydrocarbon gas production varied linearly with SRC convrsion up to about 55% SRC conversion, beyond which oils production leveled off and hydrocarbon gas production increased exponentially. Hydrogen consumption, however, varied linearly with SRC conversion regardless of the conversion level. Analysis of spent catalyst revealed that its surface area and pore volume and diameter were reduced significantly and that an unusually high level of sodium (4.2%) was deposited on the catalyst, probably due to a high sodium level in the feed.

19486 (DOE/OR/03054—9, pp 423-438) **20-mesh vs 200-mesh coal study.** Mar 1983. NTIS, PC A20/MF A01.

In SRC-I quarterly technical report, July-September 1982.

Although the Phase 0 design specified a coal particle size of 90% through a 20-mesh sieve, DOE and ICRC directed Rust Engineering to conduct a study to evaluate the effect on equipment and capital investment of changing the particle size to 70% through a 200-mesh sieve. The investigation was limited to equipment and systems in the receiving and pulverization area. Rust concluded that the Phase 0 equipment, with minimal changes, could grind the specified coal to 70% through 200-mesh fineness. The primary change is an increase in the mill drive motor horsepower, and other small changes are expected in the auxiliaries. An estimated capital cost increase of $1 million is expected along with an operating cost increase of $506,720 per operating year for the two equipment trains selected.

19487 (DOE/OR/03054—9, pp 439-454) **20-mesh coal system study.** Mar 1983. NTIS, PC A20/MF A01.

In SRC-I quarterly technical report, July-September 1982.

Following submission of the SRC-I Phase 0 report to the Department of Energy in July 1979, ICRC requested an evaluation of the coal-processing, -grinding, and -transferring systems and equipment for the coal preparation area. Rust Engineering conducted the study, using data and designs developed in Phase 0. Of three dry-type coal-grinding devices studied (an air-swept tumbling-ball mill, roller race or bowl mill, and an air-swept hammer or impact mill), the tumbling-ball mill is recommended, based on the system's operability and reliability. Three systems for transferring crushed coal to the bunkers were evaluated: belt conveying, pneumatic transfer, and bucket-elevator transfer. Rust concluded that the bucket elevator system selected for Phase 0 could not be further optimized. The analyses were based on mechanical laws and grinding theories because tests have not been run on actual coal samples.

19488 (DOE/OR/03054—9, pp 455-466) **Comparison of two methods for cooling synthesis gas produced during gasification.** Mar 1983. NTIS, PC A20/MF A01.

In SRC-I quarterly technical report, July-September 1982.

In the Phase 0 SRC-I design, makeup hydrogen is provided by processing a synthesis gas that is generated by Texaco gasification of a mixture of Kentucky No. 9 coal and mineral ash residue (MAR) from filter deashing. Because the synthesis gas is hot, the Phase 0 design includes a water-quenching system to cool the gas before it is further processed. ICRC questioned whether the heat lost during gas quenching could be economically recovered. As a result, Parsons compared the economics of the Phase 0 design with those of an alternative design, in which the waste heat is used to generate high-pressure steam in a boiler system; the steam is then superheated for either export or electric power generation. Parsons determined that the original quenching system design is more feasible economically and is more reliable to operate than an alternative waste heat boiler system.

19489 (DOE/OR/20807—T1-Vol.1A) Tri-State Synfuels Project Review: Volume 1A. Executive summary and overall project review. (Tri-State Synfuels Co., Houston, TX (USA)). Jun 1982. Contract FC05-81OR20807. 408p. NTIS, PC A18/MF A01. Order Number DE83007440.

The Tri-State coal to gasoline project finally resulted from an initial Lurgigasification and Fischer-Tropsch syntheses to produce liquid fuels. As a result of changes, resulting partly from the analysis results, partly from changes in world energy price forecasts, and partly from the national administration change, the goals were changed during the work. Finally, a process resulted which seemed to have little technical risk, but which would result in higher gasoline costs than could be obtained from western coal; but there was difficulty in obtaining partners and uncertainty in getting financing or financial incentives from the US government. The history of the work is reviewed. The process advantages, contracts, licences and agreements, environmental effects, coal supplies (Kentucky) and coal testing. Tri-State believed that continued investment of substantial monies in the project could not be justified in light of: the present uncertainties of obtaining adequate financing of the plant investment; of our inability to acquire additional partners, given currently projected energy prices and continuing uncertainties surrounding the nature and ultimate amount of financig; and of government support for the planned facility. Tri-state further proposed to initiate project demobilization immediately to be completed by mid-June 1982. We expressed to SFC that in our opinion the nucleus of a synfuels industry is still a critical strategic US need and that Tri-State should be a part of that nucleus. We also encouraged SFC to investigate the project through third parties we had dealth with, such as other government agencies and potential partners who had reviewed the project.

19490 (DOE/OR/20807—T1-Vol.1B) Tri-State Synfuels Project Review: Volume 1B. Executive summary and overall project review. (Tri-State Synfuels Co., Houston, TX (USA)). Jun 1982. Contract FC05-81OR20807. 411p. NTIS, PC A18/MF A01. Order Number DE83007454.

The following subjects relating to the proposed coal to gasoline plant at Henderson, Kentucky, are considered in Volume 1B: water requirements and water supply and site selection and land purchase, permit applications, economic analysis (including process alternatives), financing (including considerations on submission to Synthetic Fuel Corporation for financial aid), market and marketing research for main products and by-products (including price forecasts and use in fuels of nonsaleable by-products), community relations, evaluating possible partners in the project, and a short discussion of engineering effort. (LTN)

19491 (DOE/OR/20807—T1-Vol.1C) Tri-State Synfuels Project Review: Volume 1C. Executive summary and overall project review. (Tri-State Synfuels Co., Houston, TX (USA)). Jun 1982. Contract FC05-81OR20807. 516p. NTIS, PC A22/MF A01. Order Number DE83007441.

Volume 1C consists of a bibliographic list of reports relating to the project, meetings and interoffice correspondence involving planning, community relations, etc. Some short sections involve engineering, proprietary processes or equipment, or environmental effects. (LTN)

19492 (DOE/OR/20807—T1-Vol.2A) Tri-State Synfuels Project Commercial Scale Coal Test: Volume 2A. Collection and shipment mine, barge, ship and train programs. (Tri-State Synfuels Co., Houston, TX (USA)). Jun 1982. Contract FC05-81OR20807. 268p. NTIS, PC A12/MF A01. Order Number DE83007443.

This report covers the collection of Camp 1 coal at the mine in Morganfield, Kentucky and shipment of the sample to Sasolburg, Republic of South Africa from February through April 1981. The collection and shipment phase covers the inspection, sampling, preparation and analytical testwork on coal quality and size for the mine, barge, ship and train programs. The samples tested were taken at the following locations: Morganfield and Uniontown, Kentucky; Darrow, Louisiana; and Port Elizabeth and Sasolburg, Republic of South Africa. The analytical program involved complete sieve and physical/chemical characterization of the total sample and coarse and fine fractions, including ASTM and RCRA leaching tests. The coal was dry screened at 1/4-inch round hole size to simulate gasifier feed quality and boiler feed quality. The analytical testwork results are covered in a companion report (Volume 2B) while an assessment of fines utilization is reported in Volume 4. A representative portion of the shipment coal was taken to build up a 200-ton stockpile simulating dead storage at Uniontown for purposes of monthly oxidation or weathering and leaching tests for one year duration.

19493 (DOE/OR/20807—T1-Vol.2B) Tri-State Synfuels Project Commercial Scale Coal Test: Volume 2B. Collection and shipment analytical testwork. (Tri-State Synfuels Co., Houston, TX (USA)). Jun 1982. Contract FC05-81OR20807. 281p. NTIS, PC A13/MF A01. Order Number DE83007442.

This report covers the detailed analytical testwork conducted for control purposes during the collection and shipment phase as well as the results obtained by Lurgi and other parties on the composite barge sample. These tests were conducted to ensure quality control at every step during the shipment, obtain fines generation data during rehandling and establish a chemical and physical characterization of the coal for testing and design purposes. Lurgi concluded from the laboratory results that the Camp 1 coal is suitable feedstock for the Lurgi pressure gasification process. This confirms their early statements during the selection phase as reported in Volume 1. Lurgi reported that the ash melting characteristics under oxidizing conditions indicated a short ash which means that the steam/oxygen ratio will have to be controlled carefully. The chlorine content is significantly higher than most coals and the gasifier, but not the downstream equipment, must be fited with protective cladding. The Kentucky Department of Energy coal shipment examination report provides a confirmation of the ASTM standard data; in addition, analyses for macerals, microlithotypes, reflectances and anisotropy are given. The crushed, run-of-mine, oversize material which required more operating attention at Sasolburg was investigated as to source and characteristics. Specimens collected at Sasolburg and from the Kentucky stockpile were examined as reported in Section 7.2.

19494 (DOE/OR/20807—T1-Vol.2-Summ.) Tri-State Synfuels Project Review: Volume 2. Engineering and process summary. (Tri-State Synfuels Co., Houston, TX (USA)). Jun 1982. Contract FC05-81OR20807. 41p. NTIS, PC A03/MF A01. Order Number DE83007438.

The purpose of this report is to document and summarize activities associated with engineering and process design efforts on the Tri-State Synfuels Project. The proposed facility was to be a coal-to-transport fuels facility located in Henderson, Kentucky. Tri-State Synfuels Company was participating in the project as a partner of the US Department of Energy per terms of a Cooperative Agreement resulting from DOE's synfuels' program solicitation. Fluor's initial work plan called for preliminary engineering and procurement services to the point of commitment for construction for a Sasol Fischer-Tropsch plant. Overall project schedule was estimated at 24 months with an estimated value of approximately $27 MM. During the course of the project, the plant design was changed, and at the time of project suspension was based on a reduced size facility to produce MTG gasoline. Included in this volume are discussions describing the overall history of the project, its definition, evolution, and major issues addressed during its execution.

19495 **(DOE/OR/20807—T1-Vol.3) Tri-State Synfuels Project Review: Volume 3. Process evaluation, selection and design.** (Tri-State Synfuels Co., Houston, TX (USA)). Jun 1982. Contract FC05-81OR20807. 423p. NTIS, PC A19/MF A01. Order Number DE83007449.

Volume 3 consists of a very detailed comparative evaluation of the available unit operation processes (usually proprietary) that are available for such an involved plant. Something like 100 individual processes are involved in the plant and the engineering and process selection is quite involved and sometimes involves several agreements. Many of the available processes, which of course involved some hundreds, are described reasonably and the reasons for the selection given briefly. (LTN)

19496 **(DOE/OR/20807—T1-Vol.3A) Tri-State Synfuels Project Commercial Scale Coal Test: Volume 3A. Gasification test at Sasolburg, overview.** (Tri-State Synfuels Co., Houston, TX (USA)). Jun 1982. Contract FC05-81OR20807. 91p. NTIS, PC A05/MF A01. Order Number DE83007447.

The SASOL test was conducted in order to confirm the operability of the Lurgi process with Western Kentucky coal and determine the preliminary design basis for the Tri-State Synfuels Project. The test plan was structured to optimize design parameters of both the gasification and associated plants and their component units by: demonstrating the need for additional gasifiers over the 36 estimated in the feasibility study; determining the steam requirement, which was about 6% higher than for the feasibility study; confirming the oxygen requirement estimated for the feasibility study; confirming design and performance of the distributor/stirrer to be satisfactory for Illinois Basin type coal; confirming that moderately swelling and strongly caking Illinois Basin coals can be gasified in a Mark IV gasifier fitted with a distributor/stirrer when using a non-caking coal for start-up; determining coal handling and preparation should provide a proper size and minimize fines generation and reject rock material to provide a constant specific gravity coal to gasifier. Confirming that dusty tar injection is feasible up to certain limits and that all the tar injected is gasified; determining that no oil is produced directly from the gasifier; determining that no shift unit is required to adjust the hydrogen-to-carbon monoxide ratio to that required for the input to the Fischer-Tropsch Synthol Units; determining a required increase in frequency of monitoring and quality control measures; and determining that direct use of stripped gas liquor for plant cooling purposes is not practical nor economical due to the excessively high chloride levels.

19497 **(DOE/OR/20807—T1-Vol.4) Tri-state synfuels project commercial scale coal test. Volume 4. Coal fines utilization in furnace boilers.** (Kentucky Dept. of Energy, Lexington (USA)). Jun 1982. Contract FC05-81OR20807. 41p. NTIS, PC A03/MF A01. Order Number DE83007450.

This report focuses on the technical feasibility of coal fines utilization as a boiler fuel in both cyclone and pulverized fuel furnace boilers. The fines examined were representative of the fine fraction of the Camp 1 coal shipment to Republic of South Africa for the commercial scale gasification test. The Camp 1 coal has also been selected as the Tri-State Synfuels design coal and as such the sample had to be characterized both for gasification (coarse fraction) use as well as boiler (fine fraction) use, not only for in-plant steam and power but also for export to nearly potential users. Paul Weir concluded that the Camp 1 raw fines or washed fines are suitable as a potential fuel source in cyclone (wet bottom) and pulverized (dry bottom) furnaces. Several exampes of nearby utilities with the proper combustion equipment were offered. Paul Weir also identified several provisions that should be considered for the design of the storage, handling and transportation systems for the fine coal due to the ability of the coal to retain moisture. These provisions include adequate drainage, covered storage and transport facilities.

19498 **(DOE/OR/20807—T1-Vol.4A) Tri-State Synfuels Project Review: Volume 4A. Design engineering.** (Tri-State Synfuels Co., Houston, TX (USA)). Jun 1982. Contract FC05-81OR20807. 331p. NTIS, PC A15/MF A01. Order Number DE83007452.

19499 **(DOE/OR/20807—T1-Vol.4B) Tri-State Synfuels Project Review: Volume 4B. Design engineering.** (Tri-State Synfuels Co., Houston, TX (USA)). Jun 1982. Contract FC05-81OR20807. 136p. NTIS, PC A07/MF A01. Order Number DE83007451.

Volume 4B contains a general discussion of environmental pollution control and general plant mechanical engineering: air pollution control (sulfur compounds, nitrogen oxides, particulates, carbon monoxide and hydrocarbon (spills and vapor losses)); emission (at start-up and small vent disposals); solid waste management (ashes, fly ash, sludges, spent catalysts, etc.); liquid effluents (runoff, blowdown, waste water, sanitary wastes); hydrocarbon vapors from tanks (including proceedures for purging and ventilating tanks for safety). This mechanical-engineering work was accomplished by the several Fluor operations: including the engineering of all mechanical equipment, such as compressors, turbines, blowers and pumps; heat exchangers, furnaces, heaters, cooling towers and cooling systems; material handling systems; pressure vessesl and tanks; fire protection systems; and associated metallurgical and welding engineering. Specific areas of involvement included the development of narrative specifications for mechanical engineering systems and equipment, the preliminary design of the coal and ash handling systems for the plant and the general support of all engineering disciplines with regard to mechanical engineering items.

19500 **(DOE/OR/20807—T1-Vol.5(Commercial)) Tri-State Synfuels Project Commercial Scale Coal Test: Volume 5. Kentucky stockpile tests.** (Tri-State Synfuels Co., Houston, TX (USA)). Jun 1982. Contract FC05-81OR20807. 320p. NTIS, PC A14/MF A01. Order Number DE83007446.

This report focuses on the compacted coal stockpile built at Uniontown, Kentucky with a 200-ton sample representative of Camp 1 coal shipped to Sasolburg, Republic of South Africa. This stockpile program had several objectives: obtain information on the changes in quality of coal over a period of one year resulting from weatering and leaching. The weathering of coal may affect the physical and chemical properties, the gasification characteristics and oxygen consumption); obtain chemical composition of rainwater leached through the pile and collected over a period of one year to assist in the environmental design of water collection system; and demonstrate construction of a stockpile that is safe from spontaneous ignition. Conclusions and design recommendationa for the long term storage of compacted coal resulted from the program. Recommendations of interest include oxidation and weathering stability, minimal leaching due to rainwater, limited impact on gasification characteristics and effective method to minimize spontaneous ignition. The tests conducted on the compacted stockpile (Section 3.0) provided observations over the one-year period on spontaneous ignition, surface and weathering, oxidation as measured by chemical, physical and gasification property changes, size degradation, acid runoff, pH of rainwater and leachate and extent of leaching. Texas Gas was responsible for constructing, maintaining and collecting site data at the stockpile (Section 4.1.1). Paul Weir Company was responsible for sampling, screening, analytical testing program and the leaching program for the stockpile over regular intervals of one to two months (Section 4.2.1). Lurgi was requested to analyze samples (Section 4.2.2) corresponding to the samples analyzed by Commercial Testing and Engineering and report on the influence of weathering on the gasification characteristics.

19501 **(DOE/OR/20807—T1-Vol.6) Tri-State Synfuels Project Review: Volume 6. Environmental, health, safety and socioeconomic review.** (Tri-State Synfuels Co., Houston, TX (USA)). Jun 1982. Contract FC05-81OR20807. 702p. NTIS, PC A99/MF A01. Order Number DE83007539.

Volume 6 includes: site selection (National screening: Powder River Basin, San Juan Basin, Illinois Basin, East Texas lignite belt, and North Dakota-Montana lignite belt; regional screening - 12 sites in Kentucky); environmental and socio-economic factors; land use; solid waste management; beneath and safety management; regulatory review; permit applications; meteorology; local government; transportation facilities, etc. Some of the surveys were quite detailed. (LTN)

19502 (DOE/OR/20807—T1-Vol.6A) Tri-State Synfuels Project Commercial Scale Coal Test: Volume 6A. Export sample program/wastewater treatability study summary report. (Tri-State Synfuels Co., Houston, TX (USA)). Nov 1982. Contract FC05-81OR20807. 177p. NTIS, PC A09/MF A01. Order Number DE83007445.

The following can be concluded from the research conducted on the treatment of Lurgi process wastewaters from the sample sent to Sasol: Biooxidation of pretreated gas liquors and synthesized Mobil MTG process wastewater components as feasible and a high degree of treatment efficiency could be attained when the process was controlled by optimizing the growth of thiocyanate bacteria. Sludge settleability was satisfactory. Partial removal of complexed cyanide was consistently maintained during steady-state operation of the bioreactor, probably by sorption on the biofloc. Seed sludges from a coke oven activated sludge process can be successfully used to develop biocultures for the treatment of Lurgi process wastewaters. GAC treatment was effective for the removal of residual organic carbon and chemical oxygen demand from bioreactor treated effluents. Untreated gas liquor was extremely toxic to fathead minnows at effluent concentrations of only five percent (19 parts water to one part gas liquor). However, bioreactor effluent showed a greatly reduced toxicity, with significant mortalities between 40 and 60 percent (approximately one part water to one part effluent). Treatment with granular activated carbon (GAC) reduced toxicity to negligible levels, even with relatively high unionized ammonia levels present in the effluent. No toxic effects were observed with GAC effluents when the pH was adjusted to reduce unionized ammonia levels. Bioassay test results demonstrated that the treated effluents after activated carbon adsorption would be relatively nontoxic to fathead minnows. Biological wastewater treatment facilities installed to meet BPT for Lurgi wastewater should provide sufficient removal of most toxic organic pollutants which would be designated as BAT.

19503 (DOE/OR/20807—T1-Vol.7) Tri-State Synfuels Project Review: Volume 7. Permitting, environmental impact statement and related environmental information. (Tri-State Synfuels Co., Houston, TX (USA)). Jun 1982. Contract FC05-81OR20807. 332p. NTIS, PC A15/MF A01. Order Number DE83007433.

Volume 7 begins with the plan for getting all the required permit applications. It continues with the preparation of the Environmental Impact Statement - US EPA has been designated as the lead federal agency. The treatment of plant waste waters is considered and, especially, the disposal of hazardous and waste materials. Pipeline routes for gasoline and natural gas were developed in coordination with Texas Eastern Transmission Corporation and Texas Gas Transmission Corporation. Coal conveyor and coal barge routes are considered briefly. (LTN)

19504 (DOE/OR/20807—T1-Vol.8) Tri-State Synfuels Project Review: Volume 8. Commercial status of licensed process units. (Tri-State Synfuels Co., Houston, TX (USA)). Jun 1982. Contract FC05-81OR20807. 79p. NTIS, PC A06/MF A01. Order Number DE83007434.

This document demonstrates the commercial status of the process units to be used in the Tri-State Synfuels Project at Henderson, Kentucky. The basic design philosophy as established in October, 1979, was to use the commercial SASOL II/III plants as a basis. This was changed in January 1982 to a plant configuration to produce gasoline via a methanol and methanol to gasoline process. To accomplish this change the Synthol, Oil workup and Chemical Workup Units were eliminated and replaced by Methanol Synthesis and Methanol to Gasoline Units. Certain other changes to optimize the Lurgi liquids processing eliminated the Tar Distillation and Naphtha Hydrotreater Units which were replaced by the Partial Oxidation Unit. The coals to be gasified are moderately caking which necessitates the installation of stirring mechanism in the Lurgi Dry Bottom gasifier. This work is in the demonstration phase. Process licenses either have been obtained or must be obtained for a number of processes to be used in the plant. The commercial nature of these processes is discussed in detail in the tabbed sections of this document. In many cases there is a list of commercial installations at which the licensed equipment is used.

19505 (DOE/OR/20807—T1-Vol.9A) Tri-State Synfuels Project Review: Volume 9A. Subcontract information. (Tri-State Synfuels Co., Houston, TX (USA)). Jun 1982. Contract FC05-81OR20807. 639p. NTIS, PC A99/MF A01. Order Number DE83007431.

Volume 9A considers subcontract work done at the site involving hydrogeological studies with respect to water supply and geotechnical work with respect to the building foundations necessary based on boreholes drilled and the lithology of the area. (LTN)

19506 (DOE/OR/20807—T1-Vol.9B) Tri-State Synfuels Project Review: Volume 9B. Subcontract information. (Tri-State Synfuels Co., Houston, TX (USA)). Jun 1982. Contract FC05-81OR20807. 300p. NTIS, PC A13/MF A01. Order Number DE83007478.

It is recommended that Fluor engage an Aerial Photographing and Mapping consultant to photograph and provide contour maps for the proposed site. The work shall include, but not be limited to, the following activities: (1) ground control surveys necessary to produce maps of such accuracy as specified; (2) aerial stereo photography and photo index map as necessary to produce the required contour maps; (3) contour maps of the site as defined in the contract (i.e. 1 inch = 40 feet scale with 2 foot contour interval, and oriented to Plant North); (4) photomosaic of the entire site and adjacent land; (5) digitalized data for direct input to Fluor's computer program to compute cut and fill earth quantities. It is recommended that Fluor solicit proposals from a minimum of four consultants. Based upon a technical and commercial evaluation of proposals Fluor would write a unit price/lump sum price contract for professional services with a guaranteed maximum clause. Volume 9B includes the maps obtained by the subcontract.

19507 (DOE/OR/20807—T1-Vol.10) Tri-State Synfuels Project Review: Volume 10. Narrative specification. (Tri-State Synfuels Co., Houston, TX (USA)). Jun 1982. Contract FC05-81OR20807. 966p. NTIS, PC A99/MF A01. Order Number DE83007455.

The Drawing - Specification schedule of Issue Record (DSSR) lists all specifications planned for the Tri-State Synfuels project. Specifications that have been issued Approved for Construction (AFC) are included in Section 2.0 of this volume. The status and location of specifications in process can be found in Volume 12, Section 8.0. Detailed specifications are given for major nonproprietary equipment items.

19508 (DOE/OR/20807—T1-Vol.11A) Tri-State Synfuels Project Review: Volume 11A. Engineering and processing alternatives. (Tri-State Synfuels Co., Houston, TX (USA)). Jun 1982. Contract FC05-81OR20807. 437p. NTIS, PC A19/MF A01. Order Number DE83007479.

A number of feasibility studies and process alternatives are evaluated. There are 41 titles but significant work has been done on a much smaller number which can be inferred from the indexing. (LTN)

19509 (DOE/OR/20807—T1-Vol.11B) Tri-State Synfuels Project Review: Volume 11B. Process development studies. (Tri-State Synfuels Co., Houston, TX (USA)). Jun 1982. Contract FC05-81OR20807. 300p. NTIS, PC A13/MF A01. Order Number DE83007432.

During the course of the Tri-State/Fluor Management Meeting held in Irvine on October 1, 1981, Fluor was requested to prepare additional process alternate studies. Discussions held on October 2 resulted in the definition of the eight cases described in this report. The scope for these eight cases were reviewed and approved during a meeting held in Houston on October 12. During the October 12 meeting Tri-State requested the preparation of an additional four cases reflecting the use of a typical Powder River basin coal. Cases 9 thru 12 issued with Revision 1 of this report reflect results of this work.

19510 **(DOE/OR/20807—T1-Vol.11C) Tri-State Synfuels Project Review: Volume 11C. Cost reduction studies.** (Tri-State Synfuels Co., Houston, TX (USA)). Jun 1982. Contract FC05-81OR20807. 280p. NTIS, PC A13/MF A01. Order Number DE83007480.

Volume 11C involves the evaluation of several process alternatives, including some variation in the product slate, cost verification studies, cost reduction studies and other miscellaneous engineering studies. At the Tri-State Management Review Meeting of November 5, 1981, it was pointed out by Tri-State that substantial improvement in the calculated return on investment figures would be necessary to make any of the proposed cases economically attractive. A special investigative team was organized to review all aspects of the current plant cost estimate with the objective of defining and evaluating all areas where project economics could be improved by reducing investment or operating cost or by improving the project income stream. In addition, other specific items to be investigated were defined by the Tri-State Irvine Team. A list of areas to be examined was developed and is included here as Exhibit 1-1 at the end of this section. The results of all studies are summarized in Section 1.2 with detailed back-up provided in subsequent tabbed sections. Summaries outlining the configuration and basic assumptions for the various case studies are given in Table 1-1. Table 1-2 indicates cost data for the case studies while Table 1-3 gives results of the cost verification and cost improvement analyses.

19511 **(DOE/OR/20807—T1-Vol.12) Tri-State Synfuels Project Review: Volume 12. Fluor project status.** (Tri-State Synfuels Co., Houston, TX (USA)). Jun 1982. Contract FC05-81OR20807. 427p. NTIS, PC A19/MF A01. Order Number DE83007435.

The purpose of this report is to document and summarize activities associated with Fluor's efforts on the Tri-State Synfuels Project. The proposed facility was to be coal-to-transport fuels facility located in Henderson, Kentucky. Tri-State Synfuels Company was participating in the project as a partner of the US Department of Energy per terms of a Cooperative Agreement resulting from DOE's synfuel's program solicitation. Fluor's initial work plan called for preliminary engineering and procurement services to the point of commitment for construction for a Sasol Fischer-Tropsch plant. Work proceeded as planned until October 1981 when results of alternative coal-to-methanol studies revealed the economic disadvantage of the Synthol design for US markets. A number of alternative process studies followed to determine the best process configuration. In January 1982 Tri-State officially announced a change from Synthol to a Methanol to Gasoline (MTG) design basis. Further evaluation and cost estimates for the MTG facility eventually led to the conclusion that, given the depressed economic outlook for alternative fuels development, the project should be terminated. Official announcement of cancellation was made on April 13, 1982. At the time of project cancellation, Fluor had completed significant portions of the preliminary engineering effort. Included in this report are descriptions and summaries of Fluor's work during this project. In addition location of key project data and materials is identified and status reports for each operation are presented.

19512 **(DOE/OR/20807—T1-Vol.14) Tri-State Synfuels Project Review: Volume 14. Commercial scale coal test.** (Tri-State Synfuels Co., Houston, TX (USA)). Jun 1982. Contract FC05-81OR20807. 166p. NTIS, PC A08/MF A01. Order Number DE83007477.

This report focuses on the overall program consisting of planning, implementing and supervising the activities surrounding the commercial scale gasification test of Camp 1 coal in the Lurgi Mark IV gasifier at the Sasol One Plant in Sasolburg, Republic of South Africa. The overall program was conducted to provide the design and environmental criteria bases for the Tri-State Synfuels Project, a venture of Tri-State Synfuels Company. The work involved the following individual programs: Selection of Calmp 1 coal. Collection and Shipment, Gasification Test at Sasolburg, Coal Fines utilization in Furnace Boilers, Kentucky Stockpile Tests, Export Sample Program, and Wastewater Treatability Study. Each individual program is reported in detail in Commercial Scale Coal Test, Volumes 1 through 6. Supplementary work on the sampling and testing program for run-of-mine Illinois Basin coals has been reviewed in the Tri-State Synfuels Project Review Report, Volume 13, Coal Sampling and Testing, June 1982. The contents of this volume were revised in NOvember 1982 to take into account the completion of the export sample program and the wastewater treatability study. The export sample program had been interrupted by the demobilization activities but has now been completed. The wastewater treatability study was commenced prior to demobilization. However, due to the lengthy nature of the program, the study was only recent completed. The expeirmental results of both studies and design recommendations and conclusions are included in this volume.

19513 **(DOE/PC/30027—35) Recycle-slurry-oil characterization. Quarterly report, April 1, 1982-June 30, 1982.** Burke, F.P.; Winschel, R.A. (Conoco, Inc., Library, PA (USA). Coal Research Div.). Mar 1983. Contract AC22-80PC30027. 55p. NTIS, PC A04/MF A01. Order Number DE83008324.

A series of thrigy-three coal/oil agglomerations experiments and subsequent analyses and testing provided much information on the use of this process for the pretreatment of coal liquefaction feeds. Coal derived oils were identified that will deash Burning Star coal (10% ash) by coal/oil agglomeration. The results indicate that it is possible to achieve 45% ash removal with 96% recovery of organic matter and product size larger than 1 mm. Acceptable oils included recycle oils produced by the ITSL, H-Coal and SRC-II processes. Under donor liquefaction conditions, the deashed coal gave conversions and yield structures similar to the raw coal. The ash elements Ti, Fe, K, Mg and P are selectively retained in the product. The ash elements Ca, Al and S are selectively rejected. The pyrite/ash ratio and the percentage of Fe_2O_3 in the ash are both increased in the product by approximately 1.5 times relative to the feed coal. This result should prove beneficial to processes such as SRC-II that rely on mineral matter catalysis because overall feed ash levels could be reduced while maintaining high concentrations of catalytic iron-bearing minerals. The cleaned coal is expected to give better hydro-liquefaction behavior than raw coal with similar ash levels. It may be possible to further enrich the iron in the ash by using run-of-mine coal. The donor liquefaction behavior of several foreign and domestic coals (candidates for ITSL) were tested in the microautoclave with ITSL pasting solvents at a variety of conditions. Yield structures were determined for some of the runs. Preliminary analyses are presented for the samples from the early Illinois 6 coal ITSL runs. 1 figure, 32 tables.

19514 **(DOE/PC/30088—11) Coal-transformation chemistry. Eleventh quarterly progress report.** Stock, L.M. (Chicago Univ., IL (USA)). 1982. Contract AC22-80PC30088. 47p. NTIS, PC A03/MF A01. Order Number DE83007532.

The effort on donor solvent coal chemistry was centered on the role of pericyclic reactions in the liquefaction process. The product distribution in the thermal decomposition of 9-(3-phenylpropyl)phenanthrene has been examined at 400°C in tetralin. This compound was selected for study because elementary considerations suggest that decomposition by a retroene reaction should be much more favorable in this case than in any other case thus far examined in this laboratory or elsewhere. The results indicate that free radical processes dominate the product-forming reactions of this compound. The nature of alkyl ethers formed in the reductive alkylation of coal has continued to be investigated. Through means of selective dealkylation-realkylation of aryl methyl ethers in the tetrahydrofuran soluble ^{13}C-enriched reductively methylated coal and in the ^{2}H-enriched reductively perdeuterio-methylated coal, it has been determined that CoalCHROCD_3 molecules are present. Such secondary alkyl methyl ethers have not been previously identified in the products of reductive alkylation. Although the quantitative assessment of the abundance of these materials has not yet been completed, the observations suggest that about 10% of the oxygen atoms in this Illinois No. 6 coal occur in secondary hydroxy groups.

19515 (DOE/PC/40785—6) **Exploratory study of coal-conversion chemistry. Quarterly report No. 6, August 19, 1982-November 18, 1982.** Ross, D.S.; McMillen, D.F.; Fleming, R.H.; Hum, G.P.; Mansani, R.; Green, T.K. (SRI International, Menlo Park, CA (USA)). 1982. Contract AC22-81PC40785. 46p. NTIS, PC A03/MF A01. Order Number DE83005408.

Initial experiments combining compound-class (HPLC) separation of coal liquefaction products and field ionization mass spectrometric (FIMS) analysis of the various fractions to obtain improved correlations between donor-solvent structure and coal-conversion effectiveness have been performed. These experiments have used a very low-fluidity bituminous coal (PSOC-1116, Sunnyside, Utah) and tetralin and 1,2,3,4-tetrahydroquinoline (THQ) as donor solvents. Apart from indicating ways in which the chromatography procedure needs to be adjusted to achieve better separation on the basis of functional groups (compound-class separation), FIMS analysis of the various fractions has allowed us to conclude that the observed THQ incorporation (a 100%) is comprised less than 2% physical or hydrogen bonded incorporation, less than 30% by self-polymerization reactions of THQ, and at least 70% by covalent incorporation of the entire THQ molecule into coal structures. This incorporation apparently takes place by way of electrophilic substitution on coal structures, notwithstanding THQ's obvious nucleophilic properties. The conversion of bibenzyl in D_2O/CO systems at 400°C was also studied. The experiments were conducted in stainless steel tubes. The products of the conversion of neat bibenzyl were in accord with previously reported chemistry, with toluene and stilbene the major products. D_2O had no effect on the product distributions. The addition of CO in the system reduced the amount of stilbene observed, and under basic conditions, stilbene was observed only as a minor product. The disappearance of stilbene paralleled the water-gas shift reaction. It is suggested that molecular hydrogen reacts with thermally produced benzyl radicals to give toluene and/or that stilbene is hydrogenated to give bibenzyl. The implications of this reaction in the conversion of coals in the CO/D_2O system are briefly discussed.

19516 (DOE/PC/41760—T3) **Method for separation of x-ray-diffraction spectra for cobalt-ZSM-catalysts.** De Angelis, R.J. (Kentucky Univ., Lexington (USA). Dept. of Metallurgical Engineering and Materials Science). 25 Feb 1982. Contract AC22-81PC41760. 13p. NTIS, PC A02. Order Number DE82012588.

The problem of separating x-ray diffraction spectrum of one of the components from the diffraction spectrum from a mixture, if the spectrum of the remaining components is known, is often encountered in diffraction experimentation. The spectrum separation problem becomes more complex when the mixture spectrum contains a number of overlapping Bragg peaks. The presentation of a method developed to unfold a complex spectrum from a mixture, using Fourier transforms of the spectrums, is the main objective of this manuscript. The cobalt spectrum obtained from a catalyst of 9.5 cobalt on ZSM-5 zeolite using the Fourier unfolding technique is presented. The results obtained in this investigation indicate this technique to be satisfactory in unfolding x-ray diffraction spectrum from a multiphase material. 5 figures, 1 table.

19517 (DOE/PC/50794—T1) **Change in catalyst activity during catalytic steam gasification of char. First quarterly report.** Shadman, F. (Arizona Univ., Tucson (USA). Dept. of Chemical Engineering). 10 Dec 1982. Contract FG22-82PC50794. 22p. NTIS, PC A02/MF A01. Order Number DE83005817.

The change in the catalyst (KOH) activity during char-CO_2 and char H_2O reactions at 700°C and 800°C is investigated. The instantaneous rate depends on both catalyst concentration (KC) and the internal porous structure of the solid. At low values of K/C atomic ratio, the rate increases sharply with the addition of catalyst. As catalyst concentration is increased, the rate first levels off and then decreases. The leveling off is attributed to the saturation of the surface with catalytic sites. The subsequent decrease in rate seems to be due to the plugging of micropores by catalyst deposits. The reaction rate changes significantly during gasification and drops sharply before gasification is completed. The drop in rate before total conversion can be explained by the catalyst accumulation and pore plugging. 13 figures.

19518 (EUR—7597-EN-Vol.1) **Present state of technology of recovery and conversion process for synthetic fuels.** Caemmerer, D.; Niclauss, M.; Schinke, H. (Commission of the European Communities, Luxembourg). 1981. 23p. Commission of the European Communities, Luxembourg.

The various sources of synthetic fuels (coal, oil, shale, biomass and hydrogen) are discussed, with the present stage of their development. The recovery and conversion processes for synthetic fuels are covered. This includes the technology, apparatus, pollution, economy, market structure, degree of conversion and energy balance, and also certain political developments which might become decisive. Future research and development for coal conversion and biomass processes are then recommended.

19519 (EUR—7633-d,e,f,i) **Round table meeting on chemical and physical valorisation of coal.** (Commission of the European Communities, Luxembourg). 1982. 369p. (CONF-8011177—). Commission of the European Communities, Luxembourg.

From Round table meeting on chemical and physical valorization of coal; Brussels, Belgium (24 Nov 1980).

This article covers a wide range of chemical and physical processes relating to coal preparation and conversion, including hydrogenation, solvent extraction, thermal cracking and pyrolysis. Specific reactions during these processes are examined in detail and the product yields assessed. Analytical techniques involving carbon labelling and high-performance liquid chromatography are described. Attention is also given to the processing of coal-derived products, with particular reference to polycyclic aromatic hydrocarbons. Other contributions deal with the treatment of waste water using activated carbon, improving the coking properties of coal, the use of pitches in the manufacture of electrodes and research into formed coke processes. Seventeen papers have been abstracted separately.

19520 (EUR—7633-d,e,f,i, pp 3-18) **Study of the behaviour of pyrite during hydrogenation of graphite.** Cypres, R.; Ghodsi, M.; Stocq, R. 1982. (In French). Commission of the European Communities, Luxembourg.

In Round table meeting on chemical and physical valorisation of coal.

This paper examines the behaviour of pyrite during hydrogenation of graphite. Kinetic analysis was carried out by thermogravimetry. The solid residues were examined by SEM and by X-ray and electron diffraction. The results as a whole indicate that hydrogenation of graphite at temperatures below 1000 degrees C can take place in the presence of metallic iron obtained from the pyrite. Neither the latter nor its reduced form, pyrrhotite, appear to have a catalytic effect on the graphite hydrogenation reaction. (19 refs.)

19521 (EUR—7633-d,e,f,i, pp 19-43) **Study of hydroliquefaction of a Lorraine coal.** Pregermain, S. 1982. (In French). Commission of the European Communities, Luxembourg.

In Round table meeting on chemical and physical valorisation of coal.

This study was carried out using discontinuous autoclave tests in order to provide guidance in selecting the operating conditions of a pilot plant with a throughput of a few kg of coal per hour. The tests described are mainly directed towards finding suitable iron-based catalysts. For this purpose a Lorraine coal with 35% volatile matter was used, with tetralin as solvent. Synthetic catalysts were prepared by coprecipitation of iron and aluminium oxide from the nitrate solution. These preparations demonstrated the decisive influence of particle size on the action of the catalyst. An atomization drying method enables particles a few microns in diameter to be produced, forming a catalyst which is much more active than the product obtained by oven drying followed by mechanical pulverization. Steelworks dusts (converter fumes) contain particles of more or less oxidized iron with sizes of between 0.1 and 1 MUm and one of the samples examined actually exhibits significant catalytic activity. The composition of the substances accompanying the iron (basic slag) appear to have, in certain cases, an inhibitory effect on catalytic activity. (5 refs.)

19522 (EUR—7633-d,e,f,i, pp 62-87) **Steam cracking of hydrogenated middle oils and model substances.** Hillebrand, W. 1982. (In German). Commission of the European Communities, Luxembourg.

In Round table meeting on chemical and physical valorisation of coal.

Thermal cracking of middle oil and model substances tetralin and t-decalin was investigated in a laboratory apparatus. Tetralin and t-decalin were cracked at temperatures of between 700 and 890 degrees C with residence times of between 0.06 s and 0.4 s. Whereas tetralin is dehydrogenated mainly to 1, 2-dihydronaphthalene and naphthalene, cracking of t-decalin mainly produces light olefins and BTX aromatics. In both cases the product yield can be represented as a function of the conversion of the substances. Coal tar oil first underwent two-stage hydrogenation followed by thermal cracking under identical conditions to those of the model substances. Due to different conditions during hydrogenation, products of varying aromatic content were obtained which in turn produced different ethylene yields during subsequent thermal cracking. The maximum yields of the principal products from a middle tar oil consisting of >99% saturated compounds were: 25 wt% C/SUB/2H/SUB/4, 8 wt% propylene, 5 wt% C/SUB/4-olefins, 30 wt% BTX aromatics. Compared with naphtha as feedstock, the ethylene yield is somewhat lower, the propylene yield considerably lower, and the BTX yield considerably higher. The characterization quantities (e.g. BMCI) developed for petroleum fractions are only of limited use for predicting the product distribution from coal tar oils. High-performance liquid chromatography proved to be a good method of characterizing coal tar oils. (3 refs.)

19523 (EUR—7633-d,e,f,i, pp 88-124) **Low-temperature pyrolysis of coal under hydrogen pressure.** Cypres, R.; Furfari, S. 1982. (In French). Commission of the European Communities, Luxembourg.

In Round table meeting on chemical and physical valorisation of coal.

Fixed-bed hydropyrolysis of coal was studied. An installation was built capable of treating 100 g of coal at up to 900 degrees C and 100 bar. Using a Beringen coal with 32.8% volatile matter it was shown that, in a fixed bed, a devolatilization rate is achieved which is of the same order as that obtained by flash hydropyrolysis. However, the oil yield is lower due to the slower heating of the coal and the relatively long residence time of the primary volatile matter in the reaction zone. The composition of the oil depends on the pyrolysis temperature. Its benzene content increases with the latter. At constant temperature it can be shown that the influence of the hydrogen partial pressure is particularly significant between 0 and 10 bar. Above this pressure the variations in yields and compositions as a function of pressure are markedly reduced. It was also shown that from 580 degrees C, pyrolysis under hydrogen pressure produces an additional quantity of water compared with pyrolysis in an inert atmosphere under pressure or at atmospheric pressure. The increase in the amount of water formed is due to the hydrogenation reactions of the hydroxyl functions of the heavy phenols and the xylenols. This causes a hydrogen consumption equivalent to 0.2 to 0.3 wt% of coal, depending on the pyrolysis temperature. (21 refs.)

19524 (EUR—7633-d,e,f,i, pp 125-153) **Studies of the pyrolysis mechanisms of tricyclic aromatic compounds and their hydrogen derivatives, traced by means of radioactive carbon and tritium.** Bettens, B.; Ninauve, F. 1982. (In French). Commission of the European Communities, Luxembourg.

In Round table meeting on chemical and physical valorisation of coal.

Synthesis of phenanthrene 9T is obtained by catalytic reduction of the corresponding brominated derivative. The synthesis of the dehydrophenanthrene 9T, perhydrophenanthrene 9T and perhydrophenanthrene 9-10^{14}C is obtained by catalytic hydrogenation reactions under pressure in well defined temperature, reaction-time and pressure conditions. The pyrolysis of tritiated and ^{14}C-labelled phenanthrene was effected at temperatures of 850 to 900 degrees C with a residence time of 2 to 2.5 seconds. The various phases are analysed by radiochromatography. The results show that phenanthrene possesses a high degree of stability with virtually total conversion to carbon and methane at high temperature, and that the thermal degradation of the molecule at lower temperature occurs basically by two routes: elimination of carbon 9 or 10 with the formation of fluorene and methane, and elimination of a C_4 fragment including either carbon 9 or 10 and leading mainly to the formation of naphthalene. (11 refs.)

19525 (EUR—7633-d,e,f,i, pp 154-164) **Study of pyrolysis of perhydrofluorene and perhydropyrene.** Bredael, P. 1982. (In French). Commission of the European Communities, Luxembourg.

In Round table meeting on chemical and physical valorisation of coal.

Pyrolysis of perhydrofluorene and perhydropyrene was studied at temperatures of between 750 and 1000 degrees C with a residence time in the reactor of 2 x 10^{-3} sec. BTX yields of the order of 30 wt% were obtained, accompanied by the production of 40 wt% of a gas mixture rich in olefinic compounds. The results obtained, compared with those already documented for pyrolysis of c-decalin and perhydroindane, exhibit a similarity in the primary stages of the mechanism of thermal degradation of the perhydrogenated aromatic compounds. These confirm the validity of a process for producing light aromatic hydrocarbons from polynuclear aromatic compounds by perhydrogenation and thermal cracking. (4 refs.)

19526 (EUR—7633-d,e,f,i, pp 165-181) **Tar formation during pyrolysis of coals at pressures of up to 100 bar.** Arendt, P.; Van Heek, K.H. 1982. (In German). Commission of the European Communities, Luxembourg.

In Round table meeting on chemical and physical valorisation of coal.

Describes pyrolysis of five German coals under various gas atmospheres at pressures of up to 100 bar in two separate apparatuses differing basically in the heating-up rates attainable. One apparatus consists of a pressure thermobalance in which a coal sample of 1.5 g is heated at 3 K/min in a gas stream of 3 l/min. For rapid heating rates (10^2 to 10^3 K/s) 10 mg of finely ground coal is placed in a layer between special-steel wire meshes and heated linearly using a regulated electric current. The gaseous components H_2, CH_4, C_2H_4, C_2H_6, CO, CO_2 and H_2O are quantitively determined. Coke and tar are determined by weighing. The results clearly demonstrate the influence of pressure, heating rate and gas atmosphere on the quantity and composition of the tar. Low pressure and rapid heating rates in the presence of inert gas produce high tar yields. Increasing pressure and slow heating promote tar decomposition by thermal cracking. In the presence of hydrogen at high pressure and a slow heating rate a noticeable effect is observed. An additional quantity of highly aromatic compounds released directly from the coal material between 500 and 700 degrees C increases the tar yield. Rapid heating rates reduce this effect, as beyond this range the high concentration of decomposition products in the particle strongly inhibits the entry of hydrogen. (8 refs.)

19527 (EUR—7633-d,e,f,i, pp 182-199) **The thermal cracking of coal-derived materials to BTX and ethylene.** Berhardt, R.S.; Ladner, W.R.; Newman, J.O.H.; Sage, P.W. 1982. Commission of the European Communities, Luxembourg.

In Round table meeting on chemical and physical valorisation of coal.

The vapour phase thermal cracking (i.e. non-catalytic) of a range of coal-derived materials and pure compounds using laboratory scale reactors is described. Up to 27% benzene, toluene and xylenes (BTX) and 24% ethylene were obtained by cracking hydrogenated coal extract, compared with less than 4% of each from unhydrogenated extract, anthracene oil and coal, confirming the importance of naphthenes (cyclic aliphatics) and BTX and ethylene precursors. Experiments with pure compounds showed that product yields could be predicted closely from the cracking pattern of the components and the composition of the mixtures. (13 refs.)

19528 (EUR—7633-d,e,f,i, pp 290-316) **Benzene-soluble bitumen constituents and coking power of hard coals.** Abel, O.; Gao, J.; Oelert, H.H. 1982. (In German). Commission of the European Communities, Luxembourg.

In Round table meeting on chemical and physical valorisation of coal.

Following on from earlier studies by other authors, six hard coals with between 14 and 38% volatile matter were subjected to benzene-pressure extraction at temperatures of 280 C and above and the resultant extracts separated into solid bitumens and oily bitumens by precipitation with petroleum ether. The study examines the changes in coking properties (dilatation and G-value, swelling index and Roga index, and maximum fluidity in the Giseler plastometer) caused on the one hand by the decomposition treatment itself and bitumen extraction and, on the other, by the addition of total bitumens, solid bitumens or oily bitumens to the extraction residues or the original coals. The results show that caking and coking properties are partly reduced already by decomposition (without bitumen extraction) because they are determined by the colloidal structure of the coal. The caking and coking properties of the original coal cannot therefore be restored by adding isolated bitumens to the extraction residues. Only the values of the associated pressure-decomposed samples are achieved. By admixture of bitumens with the original coal, the latter's coking properties can be considerably improved. Both oily and solid bitumens increase dilatation; the caking properties are reduced by oily bitumens but increased by solid bitumens. The maximum fluidity per Gieseler is influenced in similar manner by benzene-soluble, coal-derived bitumen as by the addition of carbopitch or petroleum pitch. (8 refs.)

19529 (EUR—7633-d,e,f,i, pp 350-365) **Carbonization of coals in the C.S.M. formed-coke process.** Palumbo, L.; Colletta, A. 1982. (In Italian). Commission of the European Communities, Luxembourg.

In Round table meeting on chemical and physical valorisation of coal.

A new process for the production of formed coke has been realized by the Centro Sperimentale Metallurgico with the financial support of the main Companies of the Finsider Group. The process employs fluidized-bed technology with recirculation of the pyrolysis gases to obtain a carbonized material: the formed coke is in the form of briquets produced by compacting the carbonized material with the binder obtained in the same process. The briquets are hardened and baked in a vertical furnace at controlled temperature and pressure. The new process can use all types of coal, especially noncoking, medium-high volatile varieties. In addition, the recirculation technique allows gases to be obtained which are of industrial use as fuels or reducing agents. A feasibility study carried out in collaboration with the Italimpianti Company has demonstrated the economic and technical advantages compared with conventional coking processes, including a drastic reduction in pollution. (25 refs.)

19530 (EUR—7697-DE/EN(Vol.2)) **State of the art of winning and conversion processes for synthetic fuels.** Caemmerer, D.; Niclauss, M.; Schinke, H. (Commission of the European Communities, Luxembourg). 1982. 334p. (In German). Available from Commission of the European Communities, Luxembourg.

Coal gasification and liquefaction, oil extraction from oil shales, and biomass conversion into ethanol and biogas are dealt with. Economic aspects of the various conversion processes are discussed as well as the consumption of externally supplied hydrogen in synfuel production, energy consumption in synfuel production, and pollutants produced in synfuel production. Technological aspects of alternative synfuels are reviewed as well as the possible consequences on employment and the political situation.

19531 (NP—3900024) **Measured data acquisition in an externally heated rotory kiln lignite gasification system.** Sterzelmeier, K.K. (Technische Hochschule Aachen (Germany, F.R.). Fakultaet fuer Bergbau und Huettenwesen). 17 Mar 1980. 171p. (In German). NTIS (US Sales Only), PC A08/MF A01. Order Number DE83900024.

Thesis.

Measuring problems occurring in crude brown coal gasification in a rotary kiln with exothermal heating are discussed, i.e. pressure resistance of electronic components, data transmission from the rotating section to the laboratory system, and the problem of indirect capacitive moisture measurement in the product gas. All three contributions are classified as belonging to the field of electronic data acquisition.

19532 (PB—81-245839) **Vaporization and chemical transport under coal gasification conditions.** Hastie, J.W.; Bonnell, D.W.; Plante, E.R.; Horton, W.S. (National Bureau of Standards, Washington, DC (USA)). Dec 1980. 114p. NTIS, PC A06/MF A01.

Transpiration mass spectrometry for the quantitative analysis of high vapor temperature gases and vapors is described. This technique was applied to vapor transport and thermodynamic activity determinations for real and synthetic coal slag samples in reactive coal gas components at atmospheric pressure. A highly nonideal and nonmonotonic (with temperature and composition variables) behavior for alkali metal vapor transport was indicated. Thus a priori predictions of alkali metal transport in coal gasifiers without actual activity data are virtually impossible at the present time. Surface segregation and diffusion limitations of alkali species in slags are also possible complicating effects.

19533 (UCID—19169-Rev.1) **Underground coal gasification data base.** Cena, R.J.; Thorsness, C.B.; Ott, L.L. (Lawrence Livermore National Lab., CA (USA)). 24 Nov 1982. Contract W-7405-ENG-48. 612p. NTIS, PC A99/MF A01. Order Number DE83008245.

The Lawrence Livermore National Laboratory has developed a data base containing results from fourteen DOE-sponsored underground coal gasification (UCG) field tests. These tests include three performed by LLNL near Gillette, Wyoming at the Hoe Creek site, eight performed by LETC at a site near Hanna, Wyoming, two by GULF near Rawlings, Wyoming, and one performed by METC near Princetown, West Virginia. All tests were done in flat lying coal seams except the Rawlings tests, which utilized a steeply dipping seam. The report presents process parameters and the results of material and energy balances for each test in a variety of forms. The raw process data used to construct the data base is first discussed along with material and energy balance conventions. Following this, each test is described with the process geometry and a brief operating chronology given. Differential and integral summary information in tabular and graphic form is provided for each test. Computer tapes of the entire data base may be requested from the authors through the Lawrence Livermore National Laboratory.

19534 **Letdown valve performance at Exxon and H-coal pilot plants.** *Materials and Components in Fossil Energy Applications;* No. 39, 1-4(1 Aug 1982).

This second article in a series reports on the operating experience of letdown valves in coal liquefaction plants, describes the behavior of modified Kieley-Mueller and Cameron valves and is based on information gathered from public literature.

19535 (DOE/OR/20807—T1-Vol.5-(Proj.Review)) **Tri-State Synfuels Project Review: Volume 5. Engineering costs, budgets and schedules.** (Tri-State Synfuels Co., Houston, TX (USA)). Jun 1982. Contract FC05-81OR20807. 84p. NTIS, PC A05/MF A01. Order Number DE83007448.

This section contains estimated costs and schedules for case studies 13, 14 and 15, plus certain back-up data such as a construction labor survey in the area, original and revised budgets, risk analysis, etc. These cases are described as follows: Case 13 - Nominal quarter-size plant to produce gasoline from coal via a methanol intermediate. Case 14 - Nominal quarter-size plant to produce chemical grade methanol from coal. Case 15 - Nominal half-size plant to produce gasoline from coal via a methanol intermediate.

19536 **Level indicator for pressure vessels.** US Patent Application 6-372,861. 28 Apr 1982. 28p. Contract AI22-80PC30258.

A liquid-level monitor for tracking the level of a coal slurry in a high-pressure vessel including a toroidal-shaped float with magnetically permeable bands thereon disposed within the vessel, two pairs of magnetic-field generators and detectors disposed outside the vessel adjacent the top and bottom thereof and magnetically coupled to the magnetically permeable bands on the float, and signal-processing circuitry for combining signals from the top and bottom detectors for generating a monotonically increasing analog control signal which is a function of liquid level. The control signal may be utilized to operate high-pressure control valves associated with processes in which the high-pressure vessel is used.

19537 **Low-Btu gasification utility demonstration project.** Rodgers, M.B.; Andrus, H.E. Jr. (Gulf States Util Co, Beaumont, TX, USA). *Coal Technology;* 4: 157-177(1981). (CONF-8111140—).

From 4. international coal utilization conference; Houston, TX, USA (17 Nov 1981).

Gulf States Utilities Company's analysis of the need for coal gasification is discussed and the states of the demonstation plant project is summarized. Out of four candidates for a demonstration program (Combustion-Engineering, British Gas Corporation, Foster Wheeler, and Allis-Chalmers processes) the C-E program has been chosen as the most promising. The process development and the prelimary design of the demonstration plant at Westlake, La, is described. Plant integration concepts have been investigated and the initial process flow diagrams have been developed. 8 refs.

19538 **District gasification in New Jersey.** Huber, D.A.; Wei, S.K.; Piascik, T.M. (Burns and Roe). *Coal Technology;* 4: 329-352(1981). (CONF-8111140—).

From 4. international coal utilization conference; Houston, TX, USA (17 Nov 1981).

A preliminary study evaluation has manifested an overall technical and economic feasibility for producing a medium Btu quality gas (MBG) from eastern coal at PSEandG's Sewaren Generating Station in New Jersey by the Texaco entrained gasification process. The production of MBG for use as a fuel gas for on-site power plant boilers or for distribution to industrial customers appears to be economically attractive and in the spirit of the national goal of energy independence. For example, a 2000 tons/day coal gasification plant used to supply fuel to the Sewaren boilers would displace approximately 1,3000,000 barrels of fuel oil per year. In addition to the possible economic advantages of coal gasification, certain environmental advantages were identified in this study. The SO_2 emission from buring MBG are expected to be considerably less than from burning either coal or oil. Particulate emissions from burning MBG are also less than those from burning coal directly. However, no detailed studies were conducted to determine whether and to what extent any boiler derating would occur as the result of firing with MBG. 8 refs.

19539 **Preliminary assessment of the integration of a coal gasifier into a petroleum refinery.** Humphrey, J.L. (Argonne Natl Lab, IL, USA). *Coal Technology;* 279-291(1981). (CONF-8111140—).

From 4. international coal utilization conference; Houston, TX, USA (17 Nov 1981).

Argonne National Laboratory, in association with Hunt Oil Company and Westinghouse Electric Corporation, has evaluated the integration of a coal gasifier into a petroleum refinery. The refinery used for this study is the 30,000 BPD Hunt Oil Company refinery in Tuscaloosa, Alabama. The major gasification-train components include the Westinghouse fluidized-bed gasifier, an air separation plant, a heat-recovery system, Selexol acid-gas removal, and a sulfur-recovery plant. The gasification train will convert a nominal 280 tons/day of petroleum coke to 790,000 SCF/hr of 365-Btu/SCF gas (equivalent to 7×10^6 SCFD of natural gas), which comes close to replacing the entire 7.5×10^6 SCFD of natural gas that must be purchased. The total capital investments for a 311-ton/day plant (280-ton/day nominal feed rate with operating factor of 90% is estimated to be 41×10^6 (1986 basis. This results in a manufacturing cost for the MBG in 1986 of 4.99×10^6 Btu, based on 2.53×10^{12} Btu/yr of gas generated. 5 refs.

19540 **Coal is a gas.** Maurer, R.E.; O'Donnell, K. (Black, Sivalls and Bryson Inc, Pooler, AR). *Coal Technology;* 293-307(1981). (CONF-8111140—).

From 4. international coal utilization conference; Houston, TX, USA (17 Nov 1981).

The technology and plant design of the first utility anthracite gasification plant in the USA, at Hazelton, Pennsylvania, is reviewed. The operation of the facility and the usage of the gas in small industrial-sized borders is described. The plant includes a fixed bed atmospheric gasifier. A gas free of tars and oils is produced. Only particulates and moisture have to be removed. 2 refs.

0105 By-products

REFER ALSO TO CITATION(S) 19522, 19590, 19948, 19952

19541 **(DOE/ET/14858—T2) Development of alcohol-based synthetic transportation fuels from coal-derived synthesis gases. Final technical report, September 1979-July 1982.** (Chem Systems, Inc., Fairfield, NJ (USA). Research and Development Group). 15 Dec 1982. Contract AC22-79ET14858. 356p. NTIS, PC A16/MF A01. Order Number DE83004857.

Chem Systems, Inc. has completed a two-year R and D program formulated to develop catalysts and a reaction system for the conversion of coal-derived synthesis gases to alcohol-based, synthetic transportation fuels. The program was initiated on September 14, 1979 and involved a four-task approach which included a catalyst formulation and screening phase, a process variables evaluation phase utilizing laboratory-scale and bench-scale reactors, and a technical and economic analysis phase. The major accomplishments and conclusions achieved during the course of the program are summarized below: ALKANOL fuels, containing mixtures of methanol and C_2-C_6 saturated alcohols, represent a means of incorporating methanol into the gasoline pool while simultaneously circumventing most of the technical problems associated with the use of neat methanol-gasoline blends. Preferred catalysts and reaction conditions have been identified for the conversion of simulated coal-derived synthesis gases to ALKANOLS at high selectivity. An activity maintenance test made with one of these catalysts in a Berty gradientless, vapor-phase reactor indicated that the activity of the freshly reduced catalyst improved with on-stream time over the nominal 300-hour test while the selectivity to ALKANOLS maintained essentially constant. An analysis of the value of ALKANOLS as a gasoline pool blending stock indicates that there are certain scenarios in which specific ALKANOL fuel compositions have refining values equivalent to or better than some of the current octane improvement methods used by petroleum refiners.

19542 (EUR—7633-d,e,f,i, pp 317-349) **Study of the binding power of pitches for electrodes.** Chiche, P. 1982. (In French). Commission of the European Communities, Luxembourg.

In Round table meeting on chemical and physical valorisation of coal.

The binding power of three filtered coal tar pitches and a pitch of petroleum origin was studied in comparison with a petroleum coke. For purposes of comparison, one of the coal tar pitches was examined prior to filtration and after thermal development of a certain quantity of anisotropic mesophase. Examinations were carried out, on the one hand, on the pitches alone - technical and physico-chemical analyses - and, on the other, on the experimental electrodes before and after carbonization. The variation in volume of the pitch-coke mixture under the moulding pressure of the electrode as a function of the proportions of the mixture allows determination of the optimum amount of pitch necessary to fill the inter- and intragranular porosity of the coke. The results obtained for the carbonized electrodes clearly show, on the one hand, the beneficial effect of the aromaticity of the pitch on the quality of the binding judged by the density and electrical conductivity of the final electrode and, on the other, the detrimental effect of the insoluble particles - natural alpha resins or mesophase - which can block the pores of the coke or alter its moulding by the isotropic phase.

0106 Properties

REFER ALSO TO CITATION(S) 19408, 19409, 19410, 19411, 19421, 19431, *19467, 19472, 19482, 19483, 19484, 19492, 19493, 19513, 19514, 19520, 19524, 19529, 19574, 19667, 19764, 19784, 21196*

19543 (ACIRL-PR—81-11) **Examination of the mineral components of coal and its resultant fly ash in relation to resistivity characteristics of the fly ash.** Pandich, T.; Sullivan, K.M. (Australian Coal Industry Research Labs. Ltd., North Ryde). Dec 1981. 54p. Australian Coal Industry Research Labs. Ltd., North Ryde.

Eleven widely ranging coals and their associated fly ash samples were obtained from several Australian power stations, The coal minerals and fly ash were examined by x-ray fluorescence and x-ray diffraction techniques for elemental chemical and clay mineral analyses. The fly ash was also examined for electrical resistivity and surface chemical analysis using x-ray photoelectron spectroscopy. Scanning electron microscopy was used to examine both the coal and fly ash particles. This confirmed that fly ash comprises a large number of particles of differing appearance or nature, chemical composition and shape, which led to the development of a nature, composition, shape classification system for identifying fly ash using a scanning electron microscope. Using this system relationships were observed between the nature and composition of particles. A mathematical examination of the several chemical analysis and their relationship to the resistivity characteristics of the fly ash was undertaken. Although potential correlation between some coal characteristics and fly ash resistivity were observed, no firm relationship was established. (8 refs.)

19544 (CONF-821106—15) **Physical-property estimation for coal liquids.** Khan, A.A.; Barker, R.E.; Begovich, J.M. (Oak Ridge National Lab., TN (USA)). 1982. Contract W-7405-ENG-26. 38p. NTIS, PC A03/MF A01. Order Number DE83003483.

From Annual meeting of heat transfer and energy conversion; Los Angeles, CA, USA (14 Nov 1982).

Improved design of coal liquefaction facilities is dependent on the availability of accurate thermodynamic property estimation methods. However, since coal liquids are mixtures of a large number of pure components bound together in a complex heteroatomic group structure; traditional methods for estimating thermodynamic properties are often inapplicable. Three sets of physical properties correlations-Cavett (1962), Wilson (1981), and Starling (1980)-have been used in conjunction with the ASPEN simulator (MIT, 1981) to critically evaluate against experimental vapor-liquid equilibrium data the utility of ASPEN for simulating coal liquid separations. All three correlations were found to give close correspondence between predicted and experimental K-values for temperatures between 478 and 589 K at 13.89 MPa except for heavy boiling fractions. It was also found for the limited data examined from the SRC-II PDU vacuum flash unit that using Wilson's correlations with the Redlich-Kwong-Soave method in ASPEN predicts vapor mole fractions close to experimental results. The utility of ASPEN for coal liquids has thus been demonstrated. Examination of experimental data indicates that better boiling point characterization data, including improvements in measurements of specific gravity and molecular weight, may further improve simulation capabilities.

19545 (DOE/ET/11426—T2) **Small-angle x-ray scattering studies of the porosity of coals and chars. Final technical report, Sept. 30, 1978-March 31, 1981.** Schmidt, P.W. (Missouri Univ., Columbia (USA). Dept. of Physics). 10 Feb 1983. Contract AC22-77ET11426. 12p. NTIS (US Sales Only). Order Number DE83007040.

Small-angle x-ray scattering measurements are reported for 15 coal samples in the PSOC series of coals. The rank of the coal was found to be the main factor determining the form of the small-angle scattering curves. Analysis of the scattering curves provides evidence for the presence of three classes of pores--(1) large pores, with dimensions of at least 300 A, (2) intermediate sized pores, with average dimensions of the order of 100 or 200 A, and (3) very small pores, which with dimensions no greater than about 30 A. These three types of pores are referred to as macropores, transition pores, and micropores, respectively. The system of three kinds of pores suggested by the x-ray scattering data is in good agreement with the three-class pore structure developed by other workers' investigations employing techniques besides small-angle x-ray scattering. The specific surfaces of the coals were calculated from the scattering curves. A method was developed for estimating the fractions of the total specific surface which should be assigned to the macropores and transition pores under the assumption that the specific surface computed from the scattering curves did not include any contribution from the micropores. The specific surfaces calculated from the scattering data have been compared with the specific surfaces obtained by adsorption of nitrogen at low temperatures and by carbon dioxide at room temperature. The x-ray data are not consistent with the suggestion that many pores have dimensions of some hundreds of Angstroms but have restricted openings which exclude nitrogen at low temperatures. Instead, the high values of surface area obtained by carbon dioxide adsorptiom must be the result of the contribution of a large number of pores with minimum pore dimensions which are not greater than about 30 A. 2 figures, 1 table.

19546 (DOE/METC—82-51, pp 8-13) **Structural concepts of coal and implications of dynamic interaction.** Leonard, E. (Los Alamos National Lab., NM). Sep 1982. NTIS, PC A10/MF A01.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

Considerable progress has been reported during the last few years describing the chemical nature of coal. Newer coal structure concepts show that coal is a mixture of organic compounds. Varmann showed that coal contains significant quantities of small molecules of organic compounds having molecular weights of 200 to 300. His data, as well as data using supercritical hydrocarbon extraction processes (British National Coal Board), were suspect since molecular cleavages might occur during the severe processing steps. However, recent work at Los Alamos using pressurized, liquid carbon dioxide at 0°C again shows that stable molecules are readily removed from coal, confirming the presence of significant quantities of an apparent guest fraction. Coal then appears to be composed of stable compounds of variable composition trapped within an intractable (polymeric) matrix. This new host-guest, polymer-volatile type coal model appears as a major advance over other, essentially planar, structures. Extractive techniques, especially using liquid carbon dioxide, followed by GC-MS, had led to the nature of the guest components, even though much definitive quantitative work still remains to be done. The nature of the host fraction remains more speculative. Preliminary work at Los Alamos presumes that the host structures are composed of condensed alpha-hydroxycarboxylic acids, derived from substituted phenylpropanes. These concepts have support in recent field ionization-mass spectrometry studies in Germany (Schulten). Newer technologies need the support of an improved molecular framework describing the structure of coals. This research activity explores the validity and utility of the guest polymeric host model of coal.

19547 (DOE/METC—82-51, pp 14-19) **Investigations of the changes of coal structure occurring during gasification.** Griffiths, P.R. (Ohio Univ., Athens). Sep 1982. NTIS, PC A10/MF A01. Contract FG22-80PC30210.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

A detailed knowledge of how the chemical structure of coals affects their reactivity should greatly enhance our capability of controlling coal beneficiation reactions. Currently, two spectroscopic techniques can give information on coal structure; these are infrared and nuclear magnetic resonance spectrometry (NMR). The more popular of the two technique today appears to be NMR, yet solution phase measurements only give information on the portion of the coal that is extractable in a solvent such as pyridine while cross-polarization magic-angle NMR techniques, allow the spectrum of the solid whole coal to be measured, yield spectra with rather broad absorption bands measured at low signal-to-noise ratio (SNR), and require very expensive instrumentation. The information content of infrared spectra is theoretically higher than NMR spectra, but again several drawbacks are encountered. Techniques developed at Ohio University will enable at least two of these objections to be overcome, and possibly all three. Diffuse reflectance infrared spectra, measured on a Fourier transform spectrometer, can be obtained on powdered coals directly with no pretreatment other than grinding. The SNR of these spectra is so high that it is possible to apply a technique for resolution enhancemnt known as

Fourier self-deconvolution to sharpen up the absorption bands to such an extent that much more detailed information can be obtained on the structure of coals. The greater complexity of the spectra leads to new problems of band assignments, but even this should ultimately prove to be quite beneficial.

19548 (DOE/METC—82-51, pp 97-99) **Tables of thermodynamic data for selected chemical species.** Chase, M.W. Jr. (Dow Chemical Co., Midland, MI). Sep 1982. NTIS, PC A10/MF A01. Contract AC22-76ET10637.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

The present DOE contract extends the scope of JANAF Thermochemical Tables to cover chemical species occurring in gasifiers, methanators, combustors, MHD generators, fuel cells, gas turbines, etc., that use coal or other fossil fuel products as their feedstocks. This Dow project will review literature, evaluate accuracy of measurements, calculate thermodynamic functions, and publish thermodynamic tables in a manner that is consistent with the JANAF Thermodynamic Tables. Timely summaries of uncertain, missing, or inconsistent data are to be issued with the other products under this contract that will appear as quarterly supplements to the existing JANAF Thermochemical Tables.

19549 (DOE/OR/20807—T1-Vol.1(Commercial)) **Tri-State Synfuels Project Commercial Scale Coal Test: Volume 1. Selection of camp 1 coal.** (Tri-State Synfuels Co., Houston, TX (USA)). Jun 1982. Contract FC05-81OR20807. 135p. NTIS, PC A07/MF A01. Order Number DE83007436.

This report focuses on the rationale for selecting Camp 1 coal for a commercial scale gasification test conducted at the Sasol One Plant. The initial coal quality evaluation consisted primarily of The Pennsylvania State University coal data from Illinois Basin Counties. In November 1980, a preliminary collection of Illinois Basin coal quality data was developed to support the selection of coals for potential plant supply and full scale commercial testing. The total sample and coarse and fine fractions were analyzed. Lurgi and Sasol examined the list and gave their reasons for selection but they had not examined the samples in their laboratories. In December 1980, the list of potential source mines for the 22,000 short ton sample of raw coal for the test was narrowed to three. The mines were Camp 1, Ken and Providence. The reasons for this selection are given. The three candidate mines were again sampled and representative splits of the run-of-mine samples were flown to Lurgi and to Sasol for examination. The Lurgi laboratory report indicated that both Camp 1 and Ken mine samples would qualify as suitable gasifier feed coals. Sasol concluded from an examination of the November report data that Camp 1 and Ken mine samples would be preferable since the free swelling indices are not excessive. Paul Weir Company examined the data and recommended Camp 1 mine since it operates in the seams contiguous to other potential candidate reserve sites and has the ability to transport the mine sample by belt to a barge loading facility to limit production of fines. The final selection of the Camp 1 mine for the test shipment resulted from considerations given in the report.

19550 (DOE/OR/20807—T1-Vol.1(Sampling)) **Tri-State Synfuels Project Coal Sampling and Testing Program: Volume 1. Sampling and results.** (Tri-State Synfuels Co., Houston, TX (USA)). Jun 1982. Contract FC05-81OR20807. 235p. NTIS, PC A11/MF A01. Order Number DE83007437.

This report focuses on the sampling and testing program of run-of-mine Illinois Basin coals which was conducted for the supply and design program of the Tri-State Synfuels Project. The basic objective was to identify coals suitable for Lurgi gasification which would supplement the Camp 1 coal used as the design coal for the Tri-State Synfuels Project. The Camp 1 coal had been selected for the commercial scale gasification test at Sasolburg on the basis of its proximity to the Towhead Island Reserves, plant site and similarity of coal quality. The information developed was used as technical guidance for: assessing reserves potentially available for the project during supply negotiations; establishing a sensitivity range for the Lurgi design which used the Camp 1 coal for heat and material balances (the maximum heat rates and flow rates were used to specify requirements for major equipment); and establishing environmental design criteria in the areas of wastewater treatment and solids disposal. These results are covered in the project review reports for development, engineering and environmental aspects. The sampling and testing program consisted of selecting, collecting, preparing and analyzing samples from ten mines in Kentucky, Indiana and Illinois. The mines were operated by Peabody, Island Creek, Amax and Old Ben coal companies and represented a mix of underground - both continuous and conventional mining - and strip mining. The two predominant seams in each of the three states were sampled. The resulting technical data were judged to be representative of the coal available from reserves of the various operators. Paul Weir Company was responsible for conducting the program.

19551 (DOE/OR/20807—T1-Vol.2) **Tri-State Synfuels Project Coal Sampling and Testing Program: Volume 2. Analytical testwork.** (Tri-State Synfuels Co., Houston, TX (USA)). Jun 1982. Contract FC05-81OR20807. 284p. NTIS, PC A13/MF A01. Order Number DE83007439.

This volume contains detailed coal size analyses for the sample preparation and analytical results on the physical properties and chemical composition of the total, coarse and fine fractions. This information is useful in establishing purchase specifications and design coal sensitivity ranges for equipment sizes. The ten coals are from the following mines: Old Ben, Lynnville, Lynville 1, Camp 11, Hamilton, Providence, No. 9, Marissa, Wabash and Delta. The analytical information prepared by Commercial Testing and Engineering (Secion 2.0) contains size analyses for the actual run-of-mine coal, a representative run-of-mine coal, the run-of-mine coal crushed in the laboratory to pass 2 inches, and the total, coarse and fine fractions based on 2-inch top size. In some cases total, coarse and fine fractions had to be simulated because the operating mine breaker was not set for 2-inch top size or the mine did not have a breaker. The coal and coal ash analysis details prepared by Commercial Testing and Engineering are reported in Section 3.0. The ASTM standard methods include the proximate and ultimate analyses, equilibrium moisture, gross calorific value, sulfur forms, tumbler test, free swelling index, Hardgrove grindability, ash mineral analysis, and ash fusion temperatures. The special analyses are caking number, water soluble alkalies, spectroscopy, fluorine, mercury and Fischer assay. The University of Kentucky - Institute for Mining and Minerals Research - report their coal and coal ash analytical data.

19552 (DOE/OR/20807—T1-Vol.13) **Tri-State Synfuels Project Review: Volume 13. Coal sampling and testing.** (Tri-State Synfuels Co., Houston, TX (USA)). Jun 1982. Contract FC05-81OR20807. 44p. NTIS, PC A03/MF A01. Order Number DE83007453.

This report focuses on the sampling and testing program for run-of-mine Illinois Basin coals which was conducted for the supply and design program of the Tri-State Synfuels Project. The program is reported in detail in Coal Sampling and Testing, Volumes 1 and 2. Ten mines representative of future coal production were examined. The mines represented a mix of underground - both continuous and conventional mining - and strip mining. The two predominant seams in each of three states were sampled. The technical data on these run-of-mine coals were judged to be representative of the coal to be mined from potentially available reserves by the various operators. The overall program was conducted to identify coals suitable for Lurgi gasification which would supplement the data from the Camp 1 coal being used as the design coal for the Tri-State Synfuels Project. The Camp 1 coal had been selected for the commercial scale gasification test at Sasolburg on the basis of its proximity to the Towhead Island Reserves, plant site and similarity of coal quality. The sampling and testing program for Camp 1 coal has been reviewed in the Tri-State Synfuels Project Review Report, Volume 14, Commercial Scale Coal Test, June 1982.

19553 **(DOE/PC/10342—T1) Particle-size effects in oxidation of pyrite in air/water chemical coal cleaning. Final report, March 1, 1979-February 29, 1980.** Shah, Y.T.; Joshi, J.B. (Pittsburgh Univ., PA (USA). Dept. of Chemical and Petroleum Engineering). Mar 1980. Contract AC22-79PC10342. 48p. NTIS, PC A03/MF A01. Order Number DE83008115.

Process development of a means for precombustion removal of sulfur from coal by selective oxidation in an aqueous slurry is reported. The kinetics of the oxidation of pyritic sulfur and heating value loss for Lower Freeport coal are investigated. Experiments were conducted in a semibatch manner. The effects of coal particle size (< 72, 72 to 99, 150 to 208, 208 to 430, 700 to 1410, microns), reaction time (0 to 5400s), temperature (150 to 200°C) and partial pressure of oxygen (0.28 to 1.36 MPa) were studied. The oxidation of pyritic sulfur follows the shrinking core model where the rate controlling step was found to be the reaction between oxygen and pyrite. The analysis of the experimental data obtained in the range of variables covered in this work suggests that the rate controlling step in pyrite oxidation is the intrinsic chemical reaction between the dissolved oxygen and pyrite. The shrinking core model was successfully applied for the calculation of rate constant. The values of rate constant are practically independent of the coal particle size and oxygen partial pressure in the range covered in this work. An activation energy of 35×10^3 kJ/kmole was found. Equations for the coal weight loss and heating value loss are given.

19554 **(DOE/PC/30008—T6) Cross-polarization nuclear magnetic resonance studies of coals, coal-conversion products, and coal-conversion catalysts. Final technical report.** Maciel, G.E. (Colorado State Univ., Fort Collins (USA). Dept. of Chemistry). 1 May 1982. Contract AC22-80PC30008. 43p. NTIS, PC A03/MF A01. Order Number DE83005406.

Cross polarization magic-angle spinning ^{13}C NMR spectra of all of the samples studied are collected in this report. Because of the widely-varying characteristics of the spectra obtained on this project (e.g. different linewidths, aliphatic/aromatic ratios, aromatic chemical shift anisotropies as manifested in spinning sidebands) and because of the progress of research during the period of the project, the spectra were partitioned for analysis in various ways. In preparing this final report, we have standardized the partitioning into two alternate schemes. In one scheme the spectrum is divided arbitrarily into an aliphatic region (95 ppM to -10 ppM) and an aromatic region (the remainder of the spectrum, including spinning sidebands. This partitioning gives the f/sub a/' values (apparent aromatic fraction) reported in the tables. As the only significant sidebands from MAS come from the aromatic resonances, this (and the second) approach should account for the sidebands properly as aromatic intensity. In the second partitioning scheme the spectra are divided into three regions (I, II, III). Region II spans from 105 ppM to 70 ppM, region III from 70 ppM to -10 ppM and Region I is the remainder of the spectrum (aromatic/olefinic resonances, including their spinning sidebands). The expected error ranges given with the f/sub a/' values in the tables of this report are estimates based on experience with numerous similar samples and several replicate determinations. 33 figures, 5 tables.

19555 **(DOE/PC/30013—F2-Pt.2) Data base for the analysis of compositional characteristics of coal seams and macerals. Final report. Part 2. A multivariate study of the interrelationships among selected variables of the organic fraction of samples of United States' coals.** Gerencher, J.J. Jr. (Pennsylvania State Univ., University Park (USA). Coal Research Section). Jan 1983. Contract AC22-80PC30013. 637p. NTIS, PC A99/MF A01. Order Number DE83006580.

Multivariate statistical techniques have been applied to study interrelationships among 12 variables within a set of 277 coals representing whole-seam channel, column, and core samples obtained from each of the 6 coal provinces of the United States, and varying in rank from lignite through anthracite. The data are maintained in computerized data base at The Pennsylvania State University Coal Research Section. The variables selected are components of the elemental analysis (carbon, oxygen, organic sulfur, hydrogen, and nitrogen), selected components of the proximate analysis (volatile matter and moisture), calorific value, reflectance of vitrinite, and the relative proportions of the 3 maceral groups (total vitrinite, inertinite, and liptinite group macerals). Faactor analyses performed on the entire data set and on subsets separated on the basis of rank, geographic location, and by cluster analysis indicated that rank is the most important factor in determining the amount of variation of each data set. The rank-dependent variables for the entire data set are carbon, reflectance, oxygen, volatile matter, calorific value, and moisture. The maceral groups account for the next greatest source of variation. Organic sulfur is independent of the first 2 factors and is the third most important source of variation. Cluster analyses indicated that the most significant partitioning produces 4 groups which are differentiated primarily on the basis of rank, maceral composition, and organic sulfur content. Factor analyses of the individual groups provide insights into the coalification processes of these more homogeneous coal associations.

19556 **(DOE/PC/30054—T1) Measurement of the physical structure of coal liquids by small-angle x-ray scattering. Final technical report, April 1, 1980-March 31, 1981.** Schmidt, P.W. (Missouri Univ., Columbia (USA). Dept. of Physics). 23 Feb 1983. Contract AC22-80PC30054. 18p. NTIS, PC A02/MF A01. Order Number DE83008113.

Heavy direct coal liquefaction products are known to exhibit rapidly increasing viscosities upon prolonged exposure to oxygen. Small angle x-ray scattering has been used to monitor changes in the colloidal structure of a coal liquid subjected to accelerated aging under an oxygen atmosphere for a total period of eight weeks. The data are consistent with an agglomeration model for the formation of large colloidal size scattering centers which are partially responsible for the rapidly increasing viscosity of the coal liquid. 2 figures.

19557 **(DOE/PC/30225—T4) X-ray diffraction and scattering studies of coal constituents. Semi-annual technical progress report, July 1, 1982-December 31, 1982.** Pavlovic, A.S.; Renton, J.J. (West Virginia Univ., Morgantown (USA). Dept. of Physics). 15 Jan 1982. Contract FG22-80PC30225. 16p. NTIS, PC A02/MF A01. Order Number DE83007490.

The general objective of this work has been to use x-ray diffraction and scattering to examine coal macerals and minerals in order to perform the following studies: (1) to identify and explain differences in vitrinites and framboids from various coals. (2) to correlate differences with basic coal composition and properties. (3) to determine the systematic variability in the micro compositional variation of macerals. During this past six months work has progressed mainly in looking at correlations of the x-ray diffraction characteristics and basic coal properties. The most serious problem is still the inability to obtain coal samples whose fundamental properties are known. Nevertheless, four samples of coals were obtained from Dr. Ira Goldberg of the Rockwell International Science Center. He has measured the aromaticity of these coals and found them to have aromaticity values lying between 70% and 75%. In order to obtain some results on coals outside these values of aromaticity, it will be necessary to perform NMR magic angle spinning experiments. The Fourier Transform X-Ray (FTXR) studies have been continuing. Correlations of some ultimate analysis results and more complicated functions of Fourier Transform characteristics have been found - also, some general conclusions about the effects of various coal parameters on the (FTXR) characteristics. The micro x-ray diffraction patterns obtained on several coals have shown a variety of characteristics. They indicate that within any one coal and maceral the constitutents will exhibit a different x-ray diffraction pattern. Finally, the studies of framboids have revealed some differences between various framboids; however, the broadening of the x-ray diffraction spots from the individual microcrystallites is very slight. This indicates a high degree of crystalline perfection and certainly very few defects. 7 figures, 2 tables.

19558 **(DOE/PC/30252—T9) Hydrogen bonding in asphaltenes and coal liquids. Quarterly report, November 1, 1982-January 31, 1983.** Li, N.C.; Yaggi, N.F.; Loeffler, M.C. (Duquesne Univ., Pittsburgh, PA (USA). Dept. of Chemistry). 1983. Contract AC22-80PC30252. 23p. NTIS, PC A02/MF A01. Order Number DE83006816.

Aging of upgraded coal-derived liquids obtained from catalytic hydroprocessing of H-coal and SRC-II syncrudes has been studied. Fuel degradation, in the presence of added specific heteroatomic compounds, is monitored in the early stages by laser light scattering of developing particles at ambient temperature. The following additives have been included: 2,5-dimethypyrrole (DMP), 2,6-dimethylquioline (DMQ), phenol, 2,6-di-tert-butyl phenol (DTBP), pyridine, thiophenol, n-butyl sulfide, n-butyl disulfide, thiophene, tetrahydrothiophene, 1-hexene, copper wire, iron wire. Very pronounced enhancement of light scattering intensity has been observed for coal liquids containing the following additives: (1) Phenol, pyridine, Cu; (2) DTBP, pyridine, Cu; (3) Phenol, DMQ, Cu; (4) DMP, thiophenol. Phenolic oxidative coupling is a very important mechanism for the aging of coal liquids, and pyridine- or DMQ- complexed Cu is effective catalyst for oxidative coupling. DTBP is a hindered phenol, and therefore oxidative coupling is not as extensive as for the parent phenol. As a result, light scattering for system (2) is not as extensive as system (1). DMP by itself is deleterious to fuel stability, and the effect is enhanced by the presence of thiophenol. Thiophenes, sulfides, and hexene are much less deleterious. Iron is a poor catalyst for oxidative coupling, and therefore light scatteirng in the presence of iron is minimal. 7 figures, 1 table.

19559 (DOE/PC/40787—7) **Enthalpy measurement of coal-derived liquids. Technical progress report, November 1982-January 1983.** Kidnay, A.J.; Yesavage, V.F. (Colorado School of Mines, Golden (USA). Dept. of Chemical and Petroleum Refining Engineering). 22 Feb 1983. 8p. NTIS, PC A02/MF A01. Order Number DE83007293.

The objective of this research is to measure the enthalpy for representative coal-derived liquids and model compounds over the pressure and temperature regions most likely to be encountered in both liquefaction and processing systems, and to prepare from the data an enthalpy correlation suitable for process design calculations. The correlational effort this past quarter on the enthalpy of coal-derived syncrudes and model compounds has emphasized the experimental determination of a correlating factor for association in coal liquids. As in previous work, the degree of association is to be related to cryoscopic molecular weight determinations on the coal liquids. To this end, work on and an evaluationof a cryoscopic molecular weight apparatus was completed this quarter. Molecular weights of coal liquids determined by the standard Beckman freezing point depression apparatus were consistently low (5 to 10%). After modifications of the apparatus, it was tested with the following compounds: hexane, dodecane, m-xylene and naphthalene. Benzene was the solvent used. However, the molecular weight measurements were again consistently lower than the true values, and in many cases the experimental error was greater than that of the Beckman apparatus.

19560 (DOE/PC/40803—T5) **Characterization of tar products from rapid pyrolysis of bituminous coals. Fifth quarterly progress report, October 1982-December 1982.** Suuberg, E.M.; Unger, P.E. (Brown Univ., Providence, RI (USA). Div. of Engineering). 1982. Contract FG22-81PC40803. 8p. NTIS, PC A02/MF A01. Order Number DE83007272.

We are presently focusing mainly upon the role of mass transfer in shaping the pyrolysis behavior of softening coals. The molecular weight distribution data obtained as part of this program have given us new insights into such processes. It is well known that tar yields are increased by factors which tend to increase the rate of escape of tars from the particle (e.g., performing the pyrolysis at reduced pressures, or using small particles). Increased rates of escape allow the tar precursor species less residence time within the particle, which means that they have less time to be reoplymerized into the char fraction of the particle. The newly obtained tar molecular weight distribution data have suggested the necessity of developing a model of pyrolysis which explicitly accounts for mass transfer limitations within the particle. These limitations most likely arise from liquid phase diffusional processes rather than pore diffusional processes. The implications of the presently analyzed data are summarized in a manuscript which is to be submitted to Fuel.

19561 (DOE/PC/40809—T5) **Separation of asphaltenes using high-resolution supercritical-fluid chromatography. Progress report, December 1, 1982-February 28, 1983.** Jackson, W.P.; Fjeldsted, J.C.; Richter, B.E.; Kuei, J.C.; Kong, R.C.; Lee, M.L. (Brigham Young Univ., Provo, UT (USA). Dept. of Chemistry). 1983. Contract FG22-81PC40809. 29p. NTIS, PC A03/MF A01. Order Number DE83008321.

During this period, the developed Supercritical-Fluid Chromatography (SFC) instrumentation was applied to the analysis of a vacuum still bottoms. Small diameter (50 to 100 μm i.d.) capillary columns were used to resolve mixture components, and scanning fluorescence detection provided selective detection and identification of many separated components. This report describes the initial attempts to combine the developments in column technology and SFC instrumentation which have been made during the past 18 months to the analysis of an actual high-molecular-weight coal-derived product. In addition, an evaluation of the stability of stationary phases resulting from crosslinking procedures has been made. The commonly used peroxides for free-radical generation also promote oxidation of the tolyl crosslinking groups which ultimately lead to decomposition of the phase and limited resistance to the solvating power of the supercritical fluids used in chromatography. Azo-compounds have been found to be effective in crosslinking, and do not promote oxidation. 23 figures, 2 tables.

19562 (DOE/PC/40810—4) **Synthesis of oligomeric models of coal derived materials for use with GPC calibration. Quarterly report, September 1982-November 1982.** Baltisberger, R.J.; Jones, M.B. (North Dakota Univ., Grand Forks (USA)). Dec 1982. Contract FG22-81PC40810. 13p. NTIS, PC A02/MF A01. Order Number DE83005664.

Analysis of two asphaltene and six preasphaltene samples have shown that 60 to 80% of the total oxygen is accounted for as phenol and carbonyl groups. Thus, ethers make up no more than 40% of the oxygen in these samples. Mofification of the proposed models, particularly the preasphaltenes, by incorporation of carbonyl moieties is therefore warranted. Thirty diaryl ethers and oligo(aryl oxides), both with and without phenolic OH groups, ranging from 186 g/mole to 538 g/mole have been synthesized as model asphaltenes. Preasphaltene models have been modified to include carbonyl groups (generally as quinones). The synthesis of the first of these new models has been accomplished and work on the preparation of other models is in progress.

19563 (DOE/PC/50807—T1) **Reaction calorimetry for coal chemistry and catalysis. Quarterly report, November 1, 1982-January 20, 1983.** Arnett, E.M. (Duke Univ., Durham, NC (USA). Dept. of Chemistry). 1983. Contract FG22-82PC50807. 19p. NTIS, PC A02/MF A01. Order Number DE83005826.

After several unsuccessful attempts to study coal reactions and adsorption of bases on solid acids with our previous calorimeter, we have deferred thermochemical measurements until all of the parts of our Setaram calorimeter have arrived and it is functioning. Most of this report describes some very encouraging studies comparing free energies of absorption for a variety of bases on several types of solid acids using thin layer chromatography. 6 figures, 2 tables.

19564 (EUR—7633-d,e,f,i, pp 44-61) **Metal impurities in coal liquids and their removal during hydroprocessing.** Wyss, W.F. 1982. Commission of the European Communities, Luxembourg.

In Round table meeting on chemical and physical valorisation of coal.

The two processes being developed by the NCB for the production of low-boiling distillates from coal both involve a preliminary solvent extraction of the coal, in one case by a high boiling hydrocarbon solvent recycled from the process itself (LSE) and, in the other, by a low-boiling solvent under supercritical conditions (SGE). In both cases, while the metals content of the extract is very small (generally less than about 0.1%), complete demetallization by filtration has not proved possible. Analysis of coals and filtered coal extracts has shown that a wide range of metals is transferred from coal to extract on extraction and that the proportion transferred differs with different metals. Investigation of a catalytic method of demetallization has yielded results that suggest that some at least of the metals in the extract are organically bound. An extensive investigation into the existence of organometallic complexes in coals and coal extracts has established the presence of gallium porphyrins in several British coals and in the extracts produced in the NCB liquefaction processes. While the concentration of proved organometallic complexes in the extracts is very small, it may be inferred that larger concentrations could exist but have remained undetected. (4 refs.)

19565 (EUR—7633-d,e,f,i, pp 200-217) **Analysis of coal tar oil by chromatographic methods.** Liphard, K.G. 1982. (In German). Commission of the European Communities, Luxembourg.

In Round table meeting on chemical and physical valorisation of coal.

For some years experimental coal hydrogenation plants have again been operated in the Federal Republic of Germany, e.g. at Bergbau-Forschung GmbH. Under coal tar oil process conditions, a distillate oil is obtained with a final boiling point of around 320-340 degrees C. The oil is separated by distillation into two fractions: light oil (boiling range up to 200 degrees C) and middle oil (boiling range above 200 degrees C). Coal tar oil represents an extraordinarily complex mixture necessitating preliminary separations to allow detailed analysis. This is illustrated diagrammatically for light and middle oils. Phenols and bases are separated off by liquid-liquid extraction with NaOH or H_2SO_4. These compounds are further analysed by capillary gas chromatography. The neutral oils thus obtained are divided into structural groups by a recently developed high-performance liquid chromatography method (HPLC). Coal tar oils from various coal feedstocks can be compared directly using this method. HPLC separation can also be carried out on a preparatory scale. Consequently individual fractions are available which can be more closely characterized by other methods, e.g. by gas chromatography. Some typical chromatograms are shown.

19566 (EUR—7633-d,e,f,i, pp 218-235) **Analytical methodology in studies of polycyclic aromatic hydrocarbons in coal derived products.** Grant, D.W. 1982. Commission of the European Communities, Luxembourg.

In Round table meeting on chemical and physical valorisation of coal.

The methods currently available for the analysis of polycyclic aromatic hydrocarbons (PAH) are discussed in relation to the kind of information that may become important in future legislation. High performance liquid chromatography (HPLC), operated in conjunction with UV or spectrofluorimetric monitoring, is considered to have advantages over other techniques within the present context because of its high selectivity towards geometric isomers and the well-defined and predictable specificity of the spectrofluorimetric techniques. The performances of normal and bonded reverse-phase columns are compared and it is concluded that, at the present stage of development, normal-phase adsorption columns, packed with microparticulate silica gel, give a better and more consistent resolution between the important isomers than the bonded reverse-phase columns. Also the addition of trace concentrations of acetone as a polar modifier to the n-hexane mobile phase enables the column selectivity to be adjusted appropriate to the type of separation required. This is exemplified by the separation of a number of important PAH including chrysene, benz(a)anthracene, and the six compounds specified in the WHO directive, for drinking water, namely fluoranthene, benzo(a)pyrene, benzo(ghi)perylene, benzo(k)fluoranthene, benzo(b)fluoranthene, and indeno(123,cd)pyrene. (36 refs.)

19567 (EUR—7633-d,e,f,i, pp 236-262) **Relationships between petrographic and chemical properties of Rhenish lignite.** Wolfrum, E.; Wawrzinek, J. 1982. (In German). Commission of the European Communities, Luxembourg.

In Round table meeting on chemical and physical valorisation of coal.

In developing new designs for lignite gasification, liquefaction and coking processes, it is necessary to achieve further improvements in process economy by optimizing the quality of the feedstock. In order to provide a more detailed description of the characteristics of Rhenish brown coal during valorization, detailed petrographic and chemical analyses were carried out. Correlation calculations enabled relationships between petrographic and chemical data to be determined. (5 refs.)

19568 **(ORNL/TM—8541) Coordination of physical, chemical, and thermodynamic properties for coal conversion: proceedings of the Oak Ridge conference.** (Oak Ridge National Lab., TN (USA)). Feb 1983. Contract W-7405-ENG-26. 118p. (CONF-8206158—Summ.). NTIS, PC A06/MF A01. Order Number DE83007169.

From Coordination of physical, chemical, and thermodynamic properties for coal conversion conference; Oak Ridge, TN, USA (2 Jun 1982).

A conference on Coordination of Physical, Chemical, and Thermodynamic (PCT) Properties for Coal Conversion was held at Oak Ridge, Tennessee, on June 2 to 4, 1982. The conference was sponsored by the Oak Ridge National Laboratory, using funds provided by the Department of Energy, Oak Ridge Operations (DOE-ORO). To facilitate the workshop format, the conference attendance was limited by invitation to about 42 participants. The format included: (1) a plenary session with presentations by respected government, industry, and academic leaders, each discussing their role in PCT properties data generation and dissemination, (2) workshops on the topics of data generation, data correlation, and uses of data, and (3) an open discussion to reach consensus viewpoints. The principal results of the conference were: (1) recognition that a centralized data bank of high quality is critical to large-scale coordination of coal conversion work, (2) an agreement that some form of quality assessment of the information to be included in the data bank is necessary, (3) a recommendation to form a National Steering Committee with working groups, and (4) a decision to send a letter on behalf of the conference attendees to Dr. Sun Chun, Director of the Pittsburgh Energy Technology Center (PETC), requesting the organization of a National Steering Committee. The conference organization and the ensuing results are discussed in detail in this report.

19569 **(PB—82-239997) Laser micropyrolysis of coal macerals. Annual report Oct 80-Sep 81.** Vastola, F.J. (Pennsylvania State Univ., University Park (USA). Dept. of Materials Science and Engineering). Oct 1981. 19p. NTIS, PC A02/MF A01.

The focused output of a 100 mj pulsed ruby laser is used to pyrolyze selected macerals of coal. The analysis of the pyrolysis products is accomplished by heating the coal in the ionization chamber of a time-of-flight mass spectrometer. A high speed data acquisition system has been designed to allow the recording of the spectra at rates up to twenty thousand spectra per second during the 1-5 ms pyrolysis period. The mass spectra obtained can be used to differentiate compositional variations in coal macerals as well as their alteration with rank.

19570 **(PB—82-241415) Review of needs for thermophysical property data on solid feedstocks: 1. coal. Final report.** Callanan, J.E. (National Bureau of Standards, Boulder, CO (USA). Inst. for Basic Standards). May 1982. 32p. NTIS, PC A03/MF A01.

In January 1981, a comprehensive survey was undertaken to determine the need for thermophysical properties of the following solid feedstocks/fuels: coal, oil shale, tar sands, gas hydrates. This report deals with that portion of the survey which concerns coal and includes the results of broad consultation with industrial, government, and academic groups as indicated. This survey shows the need for experimental work on heat of combustion, heat capacity/enthalpy, thermal conductivity, and heat of wetting for both well-characterized premium coal samples and for samples of the type which will be used directly in conversion processes. Widely accepted, standardized measurement techniques do not exist for these properties, with the exception of heat of combustion, and must be developed; in addition, reliable data must be generated for efficient use of coal as a feedstock. Theoretical studies which will allow for modeling of properties should proceed along with the experimental investigations to allow for improvement in prediction of coal properties for process design.

19571 **Physical structure of coal.** Grimes, W.R. (Oak Ridge National Lab., TN). pp 21-42 of Coal science. Volume 1. Gorbaty, M.L.; Larsen, J.W.; Wender, I. (eds.). New York, NY; Academic Press (1982).

Coal seems to consist of a network of clusters-held together by mechanisms that include occasional chemical cross-links. The clusters appear to be relatively small and consist of aromatic and hydroaromatic rings and condensed rings. The cross-linkages apparently consist at least in part of ether linkages, methylene groups, and some longer alkanes. Several methods were given for determining the porosity of coal. The internal surface area of coal is determined from (1) measurements of the heat generated when coal is treated with liquids, (2) determination of the quantities of adsorbed gases or vapors as functions of temperature and adsorbate pressure, and more recently, (3) by careful examination of scattering by x rays incident at very small angles. The internal surface of coal is largely associated with a micropore system in which 30 A (or smaller) diameter pores are constricted or linked by 5 to 8 A passages. The effects of heat on the pore structure, devolatilization and plastic behavior of coal were discussed. 110 references, 1 table. (DP)

19572 **Magnetic resonance studies of coal.** Retcofsky, H.L. (Pittsburgh Energy Tech. Center, PA). pp 43-82 of Coal science. Volume 1. Gorbaty, M.L.; Larsen, J.W.; Wender, I. (eds.). New York, NY; Academic Press (1982).

Electron spin resonance and nuclear magnetic resonance spectrometries have become extremely valuable tools in coal research. This work described was undertaken by the Pittsburgh Energy Technology Center. ESR and NMR provide valuable data that have led and will continue to lead to a better understanding of coal structure and how this structure is altered during the natural processes involved in coalification and during man-made processes for converting coal into more suitable fuels. ESR studies of respiratory-size mine dust appear to give little additional insight into the understanding of coal workers' pneumoconiosis. 20 figures, 9 tables. (DP)

19573 **Reductive alkylation reaction.** Stock, L.M. (Univ. of Chicago, IL). pp 161-279 of Coal science. Volume 1. Gorbaty, M.L.; Larsen, J.W.; Wender, I. (eds.). New York, NY; Academic Press (1982).

The chemical reduction of coal can be accomplished in several different ways. This review was primarily concerned with the reductive alkylation reaction and with other pertinent procedures such as reduction without alkylation and alkylation without reduction because, although many electrophilic reagents react rapidly with the coal polyanion, almost all of the research undertaken in this area has focused on the reactions of these anions with proton donors and with alkylating agents. All these reactions can provide a broad spectrum of information concerning the structural characteristics and reactivity of coal. 16 figures, 56 tables. (DP)

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REFER ALSO TO CITATION(S) 19434, 19435, 19470, 19471, 19481, 19503, 19512, 19625, 19637, 19643, 20307, 21699, 21700, 21701, 21702, 21703, 21704, 21707, 21708, 21709, 21710

19574 **(ACIRL-PR—81-7) Development of a laboratory corona apparatus. Part 1.** Baker, J.W.; Smith, P.D. (Australian Coal Industry Research Labs. Ltd., North Ryde). Sep 1981. 58p. Australian Coal Industry Research Labs. Ltd., North Ryde.

A laboratory scale, point plant corona apparatus has been developed with the aim of producing voltage current corona characteristics which are similar to those found in a large scale pilot precipitator. The project was undertaken to enable corona characteristics to be obtained which were more interpretable than those obtained in an existing wire cylinder apparatus. A series of tests have been performed in the point plane apparatus with ten power station fly ashes. These tests have lacked repeatability and have not matched the pilot precipitator corona characteristics satisfactorily in most cases. Other properties of these fly ashes have been measured, particularly resistivity and carbon content, and correlation between these properties and corona characteristics were tested. An investigation showed that the lack of repeatability was due to variations in craters which form in the ash layer. The differences between point plane apparatus and pilot precipitator results also appear to be caused mainly by differences in crater formation. The point plane apparatus had a small measuring electrode where individual craters could have a dominant effect. In order to improve control of cratering and to avoid an individual crater having such a dominant effect the size of the electrode has now been increased twenty times. (15 refs.)

19575 **(BMFT-FB-T—81-102) Process for removing sulfur oxides from gases with direct production of a usable finished reaction product. Final report, October 1980.** Fischer, H.J.; Kremer, G. (Walther Cie A.G., Cologne (Germany, F.R.)). Jul 1981. 38p. (In several languages). NTIS, PC A03/MF A01.

Bundesministerium fuer Forschung und Technologie Sponsored by Bundesministerium fuer Forschung und Technologie.

During the described phase of testing, the waste-water-free Walther-process could be advanced considerably and tried in the final process conception after a coal-fired power-station block. The ammonia sulfate obtained as a waste-product, meets the requirements of the fertilizer industry. Further processing of this pulverous waste-product to obtain a marketable end-product was investigated and demonstrated in a pelletizing unit with subsequent drying in a drum-type drier. The possibility of reheating the gases in a FGD-plant (flue-gas desulfurization plant) without application of energy from foreign source was proven by the use of a regenerative heat exchanger. As regards spray-drying, a variant was investigated: a partial flow of the high-temperature flue-gas was branched before the airheater and spray-drying of the oxidized scrubbing liquid resulting from the desulfurization process was carried out in this partial flow.

19576 **(CONF-8205161—1) Pollution-control costs: a status report.** Witmer, F.E.; Livengood, C.D. (USDOE Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness, Washington, DC. Office of the Deputy Assistant Secretary for Environment, Safety and Health; Argonne National Lab., IL (USA)). May 1982. Contract W-31-109-ENG-38. 19p. NTIS, PC A02/MF A01. Order Number DE83007679.

From International symposium on the economic aspects of coal pollution abatement technologies; Petten, Netherlands (24 May 1982).

The purpose of this study is to assess the economic, energy, and environmental impacts of possible New Source Performance Standards (NSPS) for 68 combinations of boiler size, emission standards, load factor, and combustion/control technologies. The results of the study show that Low-Btu gasification is not competitive with direct coal combustion for any level of control in the systems studied. The market for LBG technology will depend primarily on the availability and relative prices of petroleum and natural gas. Direct firing of low-sulfur coal is the least-cost option for Level-1 control and gives by far the lowest level of SO_2 emissions. However, AFBC is economically competitive with low-sulfur coal at the 75 and 150 million Btu/hr sizes (within the uncertainty of the estimates) and is more attractive than the other options. For Level-2 control, dry FGD was found to be competitive with wet FGD, but still more expensive than AFBC. Although dry FGD was not evaluated for high-sulfur-coal applications in this study, recent experience with a retrofitted spray dryer/fabric system at ANL has indicated that such systems should also be competitive for high-sulfur coals. At level 3, AFBC and wet FGD are the favored technologies for the larger boilers. SRC is nearly competitive at 150 and 75 million Btu/hr, and is clearly the economic choice at 30 million Btu/hr, especially for the lower load factor. Although SNG was not evaluated for the smaller boilers, it is expected to be competitive with SRC in those cases at the stringent control level. The most attractive technology options as determined by this study depend on boiler size, load factor, and level of control required. Direct combustion is favored for larger boilers, while coal-derived synfuels and petroleum-based fuels are most attractive for small boilers operating at low load factors. The systems approach to technology comparisons reveals important facets that would not be shown by narrowly focussed case studies.

19577 (DOE/EV/10367—27) **Experimental study of organically contaminated water in a cooling tower.** Goldstein, D.J.; Aiyegbusi, O. (Water General Corp., Cambridge, MA (USA)). 1 Dec 1982. Contract AC02-80EV10367. 66p. NTIS, PC A04/MF A01. Order Number DE83005645.

A pilot model cooling system was set up and run so as to simultaneously cool heat exchanger tubes and biologically degrade phenol in the makeup water. The cooling tower used 1 ft^2 by 3 ft high, wetted film, polygrid, PVC packing. Water was circulated at 2.5 gpm (5.6 ft/sec) through two parallel heat exchange tubes immersed in a water bath controlled at 150°F. Total water flow was 5 gpm/ft^2 of tower. Air was forced through the tower to give a liquid to gas mass ratio of 1.3. The cooling water circulated with an average temperature rise of 10°F and an average approach to the air wet bulb temperature of 12°F. Conclusions of this study are: (1) The pilot cooling tower was successfully operated to simultaneously cool and biodegrade phenol in the makeup water. Operation was not difficult and the experiments were reasonably reproducible. (2) An equivalent average concentration of phenol in the makeup water of 165 ppM (300 ppM BOD) should present little problem in commercial practice. An equivalent average concentration of up to 600 ppM phenol (1200 ppM BOD) may be acceptable in practice. Concentrations higher than 600 ppM phenol will cause such rapid biofouling and such rapid production of suspended solids in the circulating water as to be impractical. (3) More than 85 percent of the phenol removed was by biodegradation. Not more than 15 percent was stripped into the atmosphere. 12 figures, 12 tables.

19578 (DOE/METC—82-42-Vol.2) **Acid rain: control strategies for utility boilers. Volume II. Appendices.** (PEDCo-Environmental, Inc., Cincinnati, OH (USA)). May 1981. Contract AC21-81MC16361. 588p. NTIS, PC A25/MF A01. Order Number DE83006564.

These appendices provide a detailed breakdown of cost estimates for SO_2 and NO/sub x/ control strategies applied to the top 50 coal-fired SO_2/NO/sub x/ emitters as defined in the summary report: Acid Rain Control Strategies for Utility Boilers, Volume 1. Appendix A contains costs for the eastern and western low-sulfur coal strategies; Appendix B, costs for the 90% and 60% (partial scrubbing) SO_2 control attained through the use of wet flue gas desulfurization; Appendix C, costs for dry flue gas desulfurization (applicable to only three plants); and Appendix D, NO/sub x/ control costs for low-NO/sub x/ burners and overfire air. All costs are in 1980 dollars, and treatment of annual operating and maintenance and fixed charges is as uniform as possible to maximize comparisons on the same or similar basis.

19579 (DOE/METC—82-51, pp 181-185) **Treatment of coal gasification process wastewater.** Strakey, J.P. (Pittsburgh Energy Technology Center, PA). Sep 1982. NTIS, PC A10/MF A01.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

The availability of effective and economic environmental controls is required to enhance the utility of coal gasification technology. An area of major environmental concern is the wastewater produced by these processes. These wastewaters are considered to be complex in nature containing phenolic compounds, polynuclear aromatic compounds, ammonia, hydrogen sulfide, and numerous hazardous organic and inorganic pollutants. These wastewaters must be treated and the contaminants eliminated or reduced to acceptably low concentrations before discharge to the environment or reuse in the plant. Certain conventional wastewater treatment unit operations and processes are generally considered applicable to the treatment of coal conversion process wastewater. At present, no operating demonstration or commercial-scale coal conversion wastewater treatment facilities exist. Operating data from large-scale facilities are not available to determine the actual effectiveness and feasibility of the wastewater treatment unit operations and processes mentioned above in the treatment of coal conversion process wastewaters. In order to provide this information, bench-scale laboratory investigations have been conducted at PETC to determine the effectiveness of these environmental controls for coal gasification process wastewater and to obtain data useful in the design of large-scale facilities. The wastewater treatment program at PETC has provided data from bench-scale evaluations of various wastewater treatment unit operations and processes documenting the effectiveness of these environmental controls and providing useful information for the design of large-scale facilities.

19580 (DOE/METC—82-51, pp 188-189) **Environmental studies.** Paulson, L.E. (Grand Forks Energy Tech. Center, ND). Sep 1982. NTIS, PC A10/MF A01.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

The required level of treatment for gasification wastewater is dictated by its end use, which in the case of the Great Plains Gasification Project is the cooling tower. The extent of wastewater treatment needed to produce a satisfactory feed to the cooling tower is unknown; the environmental and economic risks are substantial. Great Plains proposes to process the wastewater by tar water separation, solvent extraction, and ammonia stripping and then feed to a cooling tower. Phenolic distribution coefficients for raw wastewater and a variety of solvents, including the two that apparently are used in commercial processes, were determined. Methyl isobutyl ketone (MIBK) showed the largest distribution coefficient for wastewater phenolics and was selected for use in subsequent studies. SFBG wastewater pretreated by solvent extraction and ammonia stripping was tested in activated sludge (AS) systems with and without addition of powdered activated carbon (PAC) at full strength. Effluent from PAC/As treatment was somewhat lower in TOC, COD, phenolics, organic nitrogen, and color than AS-treated alone. However, both AS- and PAC/AS-treated wastewater showed excellent reduction in extractable/chromatographable organics with effluents containing only low levels of relatively few compounds. The key to wastewater processing apparently lies in the solvent extraction for phenol recovery: when phenolics were reduced to the range of a few mg/1 by solvent extraction, most wastewater organic contaminants - both aqueous and suspended phase - were reduced to detection limits. Solvent-extracted wastewater did not require dilution prior to biological treatment, and had less tendency to foam and a lower COD, TOC, and color than did a similar sample diluted to the same phenolic level.

19581 (DOE/METC—82-51, pp 190-193) **Advanced process development for wastewater treatment processes.** Genung, R.K. (Oak Ridge National Lab., TN). Sep 1982. NTIS, PC A10/MF A01.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

The project has two tasks. The objective of the first task is to develop and evalute a fixed-film, fluidized-bed bioreactor as a biooxidation process for use in coal conversion wastewater treatment systems. Work includes the definition of process design parameters, the identification and evaluation of operating parameters to be used for process control, and the demonstration of steady state operaton for extended periods. The objective of the second task is to develop a process flow diagram and an associated R & D plan for a mobile wastewater treatment process demonstration unit containing selected unit operations. The new bioreactors technology has the potentail for having significant advantages over technologies such as the activated sludge process or the rotating biological contactor conventionally used for biooxidation. The concepts being exploited in this development include the following: use of inert support particles to confine films of active biomass within a continuous-flow bioreactor; development of significantly higher active-biomass-to-reactor volume ratios than those obtained in conventional systems; use of reactor geometries that optimize hydraulic behavior; and use of closed-reactor systems to minimize the environmntal and health impacts associated with vapors and aerosols produced from open-air biooxidation systems. The purpose of the second task is to develop iformation that could be used to guide the future development and execution of a field wastewater treatment R & D program based on unit operatons of a scale adequate to produce credible design and cost data. Information produced will include recommendations for process selection, estimates of construction and operationg cost, and a basic outline for essential R & D activities.

19582 (DOE/METC—83-51, pp 5-16) **Particulate sampling from a high temperature and high pressure process stream.** Wegrzyn, J. (Brookhaven Natonal Lab., Upton, NY). 1981. NTIS, PC A18/MF A01.

From DOE contractor's workshop on particulate sampling and characterization; Morgantown, WV, USA (16 Jun 1981).

Sampling from a coal process stream poses many unique problems for the investigator in obtaining representative data. A brief overview of same of these problems, along with possible solutions, are discussed. In particular, problems of the definition of an irregular type particle, flow measurement and control, characterization of the process stream, and preservation of the sample are reviewed in terms of their impact on the design features of an extractive sampling probe. It is argued that these problems are varied and complex, and only through multi-comparison tests of all types of particulate detectors can the particulate phase from the combustor to the turbine be characterized with any level of confidence.

19583 (DOE/METC—83-51, pp 98-112) **Impactor data analysis for high temperature-high pressure aerosol sampling.** Cheng, Y.S.; Newton, G.J.; Carpenter, R.L. Barr, E.B.; Yeh, H.C. (Lovelace Biomedical and Environmental Research Inst., Albuquerque, NM). 1981. NTIS, PC A18/MF A01.

From DOE contractor's workshop on particulate sampling and characterization; Morgantown, WV, USA (16 Jun 1981).

Samples collected at high tempertures and pressures in gases other than air cannot be characterized using impactor stage characteristics measured in air at ambient conditions. This paper describes a method of translating the impactor stage characteristics under ambient conditions to the sampling conditions found during HTHP sampling of low Btu coal gas.

19584 (DOE/METC—83-51, pp 201-230) **Fine particulates behavior in species concentration and temperature gradient fields.** Mahalingam, R. (Washington State Univ., Pullman, WA). 1981. NTIS, PC A18/MF A01.

From DOE contractor's workshop on particulate sampling and characterization; Morgantown, WV, USA (16 Jun 1981).

The overall objective of this study is to investigate the effects of trace species and temperature and gas phase concentration gradients influencing transportation mechanisms in organic aerosols, simulating tars. The results will be applicable in the development and evaluation of sampling strategies and batch and real-time monitoring instrumentation development, for gas streams from gasifiers and fluidized bed combustors. Additionally, the results will be useful in formulating control strategy, technology, and control equipment. An experimental unit, capable of generating aerosol streams whose output and size distribution are constant and a reproducible, has been set up. The unit consists of an aerosol generator, a dilution chamber, a charge neutralizer, a set of cyclones and replaceable test sections of various geometries and controllable parameters. Monitoring across the test section is with Nuclepore filters, cascade impactors, condensation nuclei counter, diffusion battery, and electrical aerosol analyzer. In the runs carried out till now, the test sections used in the experimental unit are straight sections of 0.305" i.d. and 2' and 7' long stainless steel tubes, to simulate the probes typically used in a gasifier. The evaluation, however, has been under ambient isothermal conditions. Both methylene blue and dioctyl phthalate aerosols, in the size range 0.03 to 3 μm, have been used in these runs. The aerosol loadings have been in the range 0.001 to 2.0 g/m^3, the capacity of the unit being up to 4 g/m^3. Both laminar and turbulent flows have been evaluated. These results show that there is negligible deposition and size redistribution, as to be expected; also, these results establish baseline conditions for subsequent phase of the investigation.

19585 (DOE/METC—83-51, pp 241-255) **New instrument for isokinetic sampling in high temperature stacks and ducts.** Nelson, P.A. (TSI Inc., St. Paul, MN). 1981. NTIS, PC A18/MF A01.

From DOE contractor's workshop on particulate sampling and characterization; Morgantown, WV, USA (16 Jun 1981).

A new commercially available in-situ instrument for particle sampling is described. Its unique characteristic is its ability to isokinetically sample and collect from a moving gas stream over wide ranges of temperature and velocity. The sampler is of a fixed design and does not require variable flow pumps nor varying inlet areas to maintain the isokinetic characteristic. Rather, it is accomplished through the aerodynamic design. The collection mechanism is electrostatic precipitation. The collection efficiency has been studied under changing operating parameters and is reported.

19586 (DOE/METC—83-51, pp 256-270) **New particle sizing impactor for heavy grain loading.** Smith, M.L. (Andersen Samplers Inc., Atlanta, GA). 1981. NTIS, PC A18/MF A01.

From DOE contractor's workshop on particulate sampling and characterization; Morgantown, WV, USA (16 Jun 1981).

Classical impactors have mass loading limits in the range of 2 to 10 milligrams per stage, which prove impractical to use in gas streams where the loading is greater than 2 grams/m^3. The Anderson high-capacity stack sampler is a 3-stage impactor that does allow sampling of stack gases under these conditions. Two impaction stages are followed by the third-stage cyclone followed by a glass fiber thimble filter. The cyclone stage can have either a 1.5 micron or a 2.5 micron cutpoint. Calibration curves are shown, and the performance tests are described. It is constructed of type 316 stainless steel and has no rubber components so it will withstand temperatures of 1200°F for long runs or 1500°F for shorter runs without the glass fiber filter. It is not designed for large pressure drops, so the internal and external pressure would have to be equalized before using in a high pressure stack. (CKK)

19587 (DOE/METC—83-51, pp 271-301) **On-line particle sizing.** VanValkenburg, E.S. (Leeds & Northrup Co., North Wales, PA). 1981. NTIS, PC A18/MF A01.

From DOE contractor's workshop on particulate sampling and characterization; Morgantown, WV, USA (16 Jun 1981).

Leeds & Northrup Company has developed and commercialized several light scattering instruments for continuous on-line measurements of particle size and concentration in liquid or gas streams. These instruments enable rapid characterization of the size distribution of solid particles and droplets by analysis of all particles crossing a laser beam. Whereas other light scattering instruments resolve individual particles and sort data according to size measurements, our method involves collecting instantaneous data from large numbers of particles and characterizing their size distribution from the composite diffraction patterns. This method enables measurement of particles from 0.1 to 1000 micrometers in diameter over large volumetric ranges and independent of refractive index. This type of instrumentation is being used extensively in industrial milling, blending and inspection processes, and special instruments have been deveoloped for measuring particles in energy conversion processes. This presentation elaborates on its applications to measuring particle loadings in high temperature/pressure gas streams of fluidized-bed combustion systems and for monitoring particles in emissions from stationary stacks.

19588 (EPRI-CS—2809) **Electrostatic-precipitator reference manual. Final report.** Gallaer, C.A. (Gallaer (C.A.), Pittsburgh, PA (USA)). Jan 1983. 432p. NTIS, PC A19/MF A01. Order Number DE83901468.

This manual is designed to familiarize the reader with the application of electrostatic precipitators (ESPs) to the collection of fly ash produced by steam boilers in the electric power industry. It is intended to be used by utility engineers who have had little or no previous background or experience in the control of fly ash emissions. The report summarizes the history and theory of electrostatic precipitation and contains an outline of steam boilers and their production of fly ash. The chemical and physical properties of fly ash are discussed in depth with emphasis upon the effects of these properties upon ESP performance. Practical guides for the selection of ESP design and size are given, along with examples of commercial and technical aspects of equipment specifications. Sections are included covering the construction, operation, and maintenance of ESPs. Special attention is given to operating and performance problem diagnostics (trouble-shooting). The report concludes with a discussion of future trends in the design and application of ESPs to electric generating plants. The manual is published in loose-leaf format to facilitate its updating as additional material on the state-of-the-art becomes available. Its organization and emphasis are the result of its writers' many years of practical experience with ESPs.

Its content is mainly derived from the voluminous literature on the subject indicated in the reference list. The initial effort coordinates and/or references some twenty EPRI research projects and ninety other published books and papers. This manual will be supplemented by guidelines which deal specifically with: (1) ESP sizing and design; (2) ESP detail specifications; (3) ESP trouble-shooting; and (4) ESP upgrading. 53 figures, 2 tables.

19589 (EPRI-CS—2817) **Preliminary evaluation of the Avco-Ebara FGT process. Final report.** Troupe, J.S. (Bechtel Group, Inc., San Francisco, CA (USA)). Jan 1983. 108p. NTIS, PC A06/MF A01. Order Number DE83901453.

This report evaluates the technical and economic feasibility of applying the Avco-Ebara flue gas treatment process to coal-fired electric utility steam generators. The technical assessment addresses the process chemistry, historical development, critical process parameters, areas requiring further development, safety and environmental concerns, and the readiness for commercialization of the process. Process design criteria are developed for a hypothetical generating station having two 500 MW units, and a conceptual design for applying the Avco-Ebara process at that station is developed and described. The major conclusions drawn from this study are: (1) the proposed flue gas treatment process is technologically feasible; (2) simultaneous removal of sulfur oxides and nitrogen oxides is possible at high efficiencies; (3) the flue gas treatment process is safe and has no adverse impact upon the environment; (4) electron-beam generation equipment large enough for use in the process is being designed, but has not yet been commercially manufactured; (5) a 10 MW process demonstration unit being implemented by the co-developer of the process is a critical step in the orderly evolution to large-scale utility use; (6) under present conditions, requiring no postcombustion NO/sub x/ control, a $48/ton return for the by-product (above transportation costs) is needed to equal the 30-year levelized revenue requirement for a wet limestone scrubbing alternative; and (7) if postcombustion NO/sub x/ control involving between 70 and 80 percent removal were required, the process, without any return for the by-product, could provide as much as a 25 percent savings in the 30-year levelized revenue requirement for an alternative of wet limestone scrubbing combined with selective catalytic NO/sub x/ reduction.

19590 (EUR—7633-d,e,f,i, pp 263-282) **Some aspects of the application of activated carbon for waste water treatment.** Berends, J. 1982. Commission of the European Communities, Luxembourg.

In Round table meeting on chemical and physical valorisation of coal.

The most important parameters which are relevant for the use of activated carbon in waste water treatment are reviewed. For a number of carbon grades from different origins, the structure, surface chemistry and resistivity against oxidation were examined. Experiments were carried out for a certain number of potential applications of activated carbon treatment. In the treatment of pesticide-plant waste water, selective adsorption of persistant substances was found. Melamine waste water could be treated in an adsorption-desorption process, although recovery of the melamine was not possible. From acrylonitrile waste water selective adsorption of one component was found, which could be recovered from the carbon.

19591 (NP—3901156) **Disposal of excess spoil from coal mining and the Surface Mining Control and Reclamation Act of 1977: a study of regulatory requirements, engineering practices, and environmental protection objectives.** (National Research Council, Washington, DC (USA). Committee on Disposal of Excess Spoil). 1981. 218p. National Academy Press, 2101 Constitution Avenue, N.W., Washington, DC 20418.

The objectives of the study were to conduct a nationwide review of engineering practices and physiographic and environmental conditions that have an impact on the disposal to excess spoil from surface and underground mining of coal and to evaluate the rationale for promulgating OSM regulations in the form of general guidelines, detailed engineering standards, or a combination of both. Chapter 3 deals with the history of the issues at hand-the earlier attempts by Congress to deal legislatively with the disposal of excess spoil, the enactment of SMCRA, and the concerns of OSM as it wrote its regulations. Chapter 4 quotes the OSM regulations pertaining to the disposal of excess spoil, presents the Committee's analysis of each of these regulations, and evaluates the costs of disposing of excess spoil. OSM's regulations pertaining to the hydrologic impacts of excess spoil fills are analyzed and pre-SMCRA state regulatory requirements are compared with the initial SMCRA regulatory requirements. Chapter 5 presents an alternative approach developed by the Committee and includes brief discussions of the regulatory approaches used by the Mine Safety and Health Administraton, the Environmental Protection Agency, and the US Geological Survey. Chapter 6 is a discussion of the characteristics of excess spoil and of excess spoil disposal areas, and of certain hazards in spoil disposal areas, such as land erosion and landslides. Chapter 7 deals with the environmental impacts of excess spoil, that is, its potential effects on water, air, land, and fish and wildlife in the vicinity of the spoil. Chapter 8 discusses engineering practices used in disposing of, and minimizing the environmental and other impacts of, excess spoil. Special attention is paid to the design of spoil disposal facilities, to the drainage of excess spoil embankments, and to the revegetation of excess spoil fills and embankments.

19592 (PB—82-227729) **Recovery of calcium carbonate and sulfur from FGD scrubber waste. Final report Aug 77-Apr 78.** Arganbright, R.P.; Huang, P.; Benner, G.S.; Mandelik, B.G.; Roche, T.S. (Kellogg (M.W.) Co., Houston, TX (USA)). Apr 1982. 143p. NTIS, PC A07/MF A01.

The report gives results of a demonstration of key process steps in the proprietary Kel-S process for recovering calcium carbonate and sulfur from lime/limestone flue gas desulfurization (FGD) scrubber waste. The steps are: reduction of the waste to calcium sulfide (using coal as the reducing agent), carbonation of the calcium sulfide to generate hydrogen sulfide and calcium carbonate, and recovery of precipitated calcium carbonate from inerts (coal ash).

19593 **Field test results of eighteen industrial coal stoker fired boilers for emission control and improved efficiency. Paper 81.35.3.** Axtman, W.; Eleniewski, M.A. (Am Boiler Manuf Assoc, Arlington, VA, USA). *Proceedings, Annual Meeting, Air Pollution Control Association;* vp(1981). (CONF-810631—).

From 74. annual meeting of the Air Pollution Control Association; Philadelphia, PA, USA (21 Jun 1981).

Results of test program are given of average data monitored on flue gases from coal-burning boiler and stoker equipment. Performances are dependent upon many variables such as fuel properties and operating procedures.

0109 Environmental Aspects

REFER ALSO TO CITATION(S) 19499, 19501, 19505, 19506, 19537, 19538, 19591, 19614, 19645, 21194, 21707, 21865, 21868, 21881

19594 (ANL/EES-TM—206) **Data for intermodal comparison of environmental impacts of inland transport alternatives for coal energy.** Bertram, K.M.; Tobin, R.L. (Argonne National Lab., IL (USA)). Mar 1981. Contract W-31-109-ENG-38. 136p. NTIS, PC A07/MF A01. Order Number DE83007577.

This report summarizes coal energy tranportation alternatives and their environmental effects. The data presented allow comparison of the alternatives and are easily scaled to give the environmental effects for specific cases. Environmental effects that are difficult to quantify are presented in descriptive form. Regional data and regulatory information on air quality, water quality, and land use allow the generic environmental effects to be applied to site-specific analyses. An example of such an analysis is included.

19595 (CONF-821175—1) **Subsurface oxidation of pyritic coal-cleaning wastes by chemoautotrophic bacteria.** Schubert, J.P.; Miller, R.M. (Argonne National Lab., IL (USA)). Nov 1982. Contract W-31-109-ENG-38. 19p. NTIS, PC A02/MF A01. Order Number DE83007965.

From Symposium on surface mining hydrology, sedimentology, and reclamation; Lexington, KY, USA (1 Nov 1982).

The presence of the iron-oxidizing bacterium Thiobacillus ferrooxidans was investigated in groundwater and surface water at two coal refuse disposal sites in southwestern Illinois. Piezometers placed in the saturated bases of reclaimed and unreclaimed refuse piles showed high populations of the bacteria. The reclaimed pile had lower populations than did the unreclaimed coal refuse, suggesting that the reclamation effort may have caused a decline in subsurface Thiobacillus population levels. Acidic runoff water from the two piles also contained T. ferrooxidans but the levels encountered are not as high as those found in the saturated bases. Population levels of T. ferrooxidans were not high in till below the gob pile or in slurry material at the Staunton site. This may be attributed to the lower acidity and dissolved iron concentrations in groundwater at these locations, as well as to the lack of pyrite in the till and slurry material. Statistical analysis of T. ferrooxidans populations and six water quality variables for runoff and groundwater samples from the two sites showed that all seven variables were significantly intercorrelated. More samples and additional variables must be evaluated before cause/effect relationships can be determined. High populations of T. ferrooxidans were found in the saturated bases of the two refuse piles, despite low levels (< 0.5 mg/L) of dissolved oxygen. If these bacteria can catalyze pyrite oxidation under the conditions present, reduction of acid formation by refuse burial may not be successful.

19596 **(DOE/ET/10143—T30) H-Coal Pilot Plant: surface- and ground-water monitoring program for H-Coal solid-waste storage and disposal site, E and H-11.** Gray, J.H. (Ashland Synthetic Fuels, Inc., KY (USA)). Dec 1982. Contract AC05-76ET10143. 54p. NTIS, PC A04/MF A01. Order Number DE83006750.

Operation of the H-Coal Pilot Plant causes solid wastes and process by-products to be produced. This report discusses the impact of two materials, filter cake and flaked residuum, on a disposal site. The filter cake is the dewatered biological solids from the wastewater treatment plant and the flaked residuum is a process by-product from the vacuum tower bottoms. The H-Coal solid waste storage and disposal site is located 15 miles south of the plant in Lawrence County, Kentucky. The large 274 acre licensed landfill was modified to create a 7 acre surface storage area for the flaked residuum and a 1 acre landfill area for the filter cake. Leachate testing showed the two materials to be non-hazardous by standards found in the Resource Conservation and Recovery Act. The H-Coal project still elected to monitor the surface and ground water at the site to determine what impacts, if any, were exerted by the two materials. Both the State of Kentucky and US Environmental Protection Agency Region IV located in Atlanta, Georgia have classified the wastes as non-hazardous. Analyses of the surface and ground waters show no environmental impact due to the landfill and surface storage operation.

19597 **(DOE/ET/14146—2) Mining/reclamation handbook project. Final technical report, September 1980-February 1983.** Sendlein, L.V.A. (Southern Illinois Univ., Carbondale (USA). Coal Extraction and Utilization Research Center). Feb 1983. Contract AC22-80ET14146. 16p. NTIS, PC A02/MF A01. Order Number DE83008366.

This document contains a report on the development of a Surface Mining Environmental Monitoring and Reclamation Handbook. The purpose of the book was to provide mine operators with cost-effective techniques for compliance with monitoring requirements of the Surface Mining Control and Reclamation Act of 1977 (PL 95-87). The monitoring requirements of PL 95-87 were identified and categorized into eight subject areas. These subject areas, which became the focus of the Handbook chapters, included the following: geology, hydrology, reclamation, air quality, blasting, fish and wildlife, archeological and historic resources, and subsidence. The chapter manuscripts were prepared by a team of experts representing government, industry, and academia. The Handbook will be published by Elsevier Scientific Publishing Co., Inc. in late 1983. A bibliography developed during the course of the project is available from the National Technical Information Service (NTIS).

19598 **(MST-LUFT-A—52) Annual report for 1981.** (Miljoestyrelsen, Roskilde (Denmark). Luftforureningslab.). Mar 1982. 40p. (In Danish). Miljoestyrelsen, Roskilde, Denmark.

Activities of the Danish Air Pollution Laboratory of scientific and administrative character are listed. Two large projects 'Operational Meteorological Air Quality models' and 'National Air Quality Measuring program' are prepared, cooperation with municipal and meteorological authorities is in progress. Staff publications are listed. (Available from Miljoestyrelsens Luftforureningslaboratorium, Risoe DK-4000 Roskilde, Denmark) (In Danish)

19599 **(NP—3901160) Coal mining and ground-water resources in the United States.** (National Research Council, Washington, DC (USA). Committee on Ground-Water Resources in Relation to Coal Mining). 1981. 212p. National Academy Press, 2101 Constitution Avenue, N.W., Washington, DC 20418.

The purpose of this report is to examine the expansion and geographical redirection of coal mining now occurring in the United States, its effects on ground water, and the environmental and socioeconomic impacts of those effects. The report addresses ground-water use, ground-water supplies and availability, principles that govern the functioning of hydrogeologic systems, and the institutional framework for ground-water allocation. Because of the geological, hydrological, climatic, and water-rights differences between the eastern and western United States, the study includes separate examinations of the specific ground-water implications of coal mining in both regions. The report addresses all coal mining technologies, including surface mining, underground mining, and underground coal gasification. However, it does not include ground-water effects that may result from transportation or consumption of coal or from any other coal-related activity, unless that activity is an integral part of operations at the mine site. This report describes how methods of coal extraction may affect ground water and assesses methods for mitigating adverse effects during and after mining. The report appraises the state of knowledge within the discipline of hydrogeology. Mining affects both ground-water quantity and quality. The effects of mining on ground-water levels and flow normally occur quickly and can be identified and monitored. Equilibrium in ground-water levels and flow regimes is often readily reestablished, but changes in ground-water quality can be long lasting and difficult to reverse. Furthermore, the exact nature of future ground-water quality degradation as a result of mining cannot always be anticipated. Some effects of mining cannot be identified until long afterward, and this time lapse makes mitigation difficult.

19600 **(PB—82-222910) Environmental assessment of coal cleaning processes. Final report Jul 76-Sep 79.** Lemmon, A.W. Jr; Robinson, G.L.; Rogers, S.E.; Van Voris, P. (Battelle Columbus Labs., OH (USA)). Apr 1982. 116p. NTIS, PC A06/MF A01.

The report summarizes a 3-year evaluation of coal cleaning processes. It discusses: physical coal cleaning (PCC) technology; the potential role of PCC in producing coals for compliance with SO2 emission regulations; pollution controls for PCC plants; assessment criteria and test methods for environmental testing at PCC plants; and baseline environmental tests at the Homer City coal preparation plant.

19601 **(PB—82-222936) Coal gasification/gas cleanup test facility: volume ii. environmental assessment of operation with devolatilized bituminous coal and chilled methanol. Final report Sep 80-Apr 81.** Ferrell, J.K.; Felder, R.M.; Rousseau, R.W.; Ganesan, S.; Kelly, R.M. (North Carolina State Univ., Raleigh (USA). Dept. of Chemical Engineering). Apr 1982. 190p. NTIS, PC A09/MF A01.

The report gives results of initial runs of a pilot-scale coal gasification and gas cleaning plant at North Carolina State University. In these runs, a devolatilized Western Kentucky No. 11 bituminous coal was gasified with steam and oxygen, and chilled methanol was used as the acid-gas removal solvent. Material balances were obtained for major elements and trace elements judged to be both volatile and environmentally hazardous. Emissions of sulfur gases in the various plant effluent streams were also measured.

19602 (PB—82-225855) Synthetic fuels development: earth-science considerations. Rickert, D.A.; Ulmam, W.J.; Hampton, E.R. (Geological Survey, Reston, VA (USA)). 1979. 53p. NTIS, PC A04.

This report provides basic information on the natural resources required for synfuel production and briefly describes some of the possible geologic and hydrologic considerations. No attempt is made to address the social, economic, air-quality, and secondary environmental effects that would result from the large-scale production of synfuels.

19603 (PB—82-258476) Procedures for predictive analysis of selected hydrologic impacts of surface mining. Final report Sep 76-Sep 81. McWhorter, D.B. (Colorado State Univ., Fort Collins (USA). Dept. of Agricultural and Chemical Engineering). Aug 1982. 98p. NTIS, PC A05/MF A01.

This report presents a methodology for the prediction of selected hydrologic impacts of surface coal mining. Procedures for estimation of the chemical and hydrologic parameters required by an algebraic water quality model are provided. The model predicts the long term mean dissolved solids concentration in combined direct and sub-surface runoff from a watershed partially disturbed by mining. The computational procedure is demonstrated in a step-by-step calculation for a mine site in Colorado. The predicted results are in satisfactory agreement with short term (2 and 3 year) observations. Procedures for determining the transmissivity of coal and overburden aquifers from single-hole aquifer tests are provided. The procedures permit the analysis of recovery data, affected by well-bore storage, following a prolonged pumping period. Well-bore storage is an important effect in the recovery of low transmissivity aquifers often encountered in coal mining related hydrology.

19604 (PB—83-114884) Selective placement of strip mine overburden in Montana. V: summary report. Open file report Jul 76-Jun 81. Dollhopf, D.J.; Goering, J.D.; Levine, C.J.; Bauman, B.J.; Hedberg, D.W. (Montana State Univ., Bozeman (USA). Agricultural Experiment Station). Jun 1981. 211p. NTIS, PC A10/MF A01.

The objective of this study was to investigate the means of establishing nonpolluted ground water and root zone systems in areas where surface mining intercepts physiochemically unsuitable overburden materials. Overburden may need to be sampled on a 60-m grid to delineate materials unsuitable for reclamation and to accurately implement selective handling operations. After 3 years the buried material remains above the reestablished aquifer and below the root zone. At least a portion of the postmine aquifer had hydraulic conductivity rates lower than the premine system, indicating the reestablished aquifer may, in part, conduct ground water very slowly. Postmine ground water chemical quality in spoil materials had poorer quality compared with premine ground water.

19605 Environmental emissions from emerging coal technologies. Paper 81.3.1. Headley, L.C.; Bajura, R.A. (US DOE, Morgantown, WV, USA). *Proceedings, Annual Meeting, Air Pollution Control Association;* vp(1981). (CONF-810631—).

From 74. annual meeting of the Air Pollution Control Association; Philadelphia, PA, USA (21 Jun 1981).

An assessment of the expected environmental emission levels caused by the probable increase of using more coal as a fuel in the future is presented. Coal will be a major domestic energy resource in the United States both for direct burning to make electric power and heat and for gasification and liquefaction. The effects of the increased levels of sulfur dioxide, nitric oxides and particulate emissions on the environment are evaluated. 14 refs.

19606 Airborne size distributions of trace elements in an industrial section of Pittsburgh. Paper 81.28.6. Davidson, C.I.; Goold, W.D.; Nasta, M.A.; Reilly, M.T. (Carnegie-Mellon Univ, Pittsburgh, PA, USA). *Proceedings, Annual Meeting, Air Pollution Control Association;* vp(1981). (CONF-810631—).

From 74. annual meeting of the Air Pollution Control Association; Philadelphia, PA, USA (21 Jun 1981).

In this study, airborne trace element size distribution, measured in an industrial area of Pittsburgh, Pennsylvania are reported. Crustal enrichment factors as a function of particle size are calculated for Al, As, Ba, Cd, Cu, Fe, Ni, Pb, V, and Zn, in order to assess differences between composition of aerosol and that of the earth's crust. 49 refs.

0110 Reserves And Exploration

REFER ALSO TO CITATION(S) 19615, 19616, 19673

19607 (USGS/MAP/C—90) Geologic map and coal deposits of the Canaan peak Quadrangle, Garfield and Kane Counties, Utah. Bowers, W.E. (Geological Survey, Denver, CO (USA)). 1981. 15p. Geological Survey, Box 25286, Federal Center, Denver, CO 80225.

0120 Mining

REFER ALSO TO CITATION(S) 19595, 19604, 19646, 19660, 19663, 19764

19608 (DOE/ET/12548—16) Automation of the longwall mining system. Zimmerman, W.; Aster, R.; Harris, J.; High, J. (Jet Propulsion Lab., Pasadena, CA (USA)). 1 Nov 1982. Contract AI01-76ET12548. 112p. (JPL-PUB—82-99). NTIS, PC A06/MF A01. Order Number DE83007267.

The longwall automation study presented is the first phase of a study to evaluate mining automation opportunities. The objective was to identify cost-effective, safe, and technologically sound applications of automation technology to understand coal mining. The prime automation candidates resulting from the industry experience and survey were: (1) the shearer operation, (2) shield and conveyor pan-line advance, (3) a management information system to allow improved mine logistics support, and (4) component fault isolation and diagnostics to reduce untimely maintenance delays. A system network analysis indicated that a 40% improvement in productivity was feasible if system delays associated with all of the above four areas were removed. A technology assessment and conceptual system design of each of the four automation candidate areas showed that state-of-the-art digital computer, servomechanism, and actuator technologies could be applied to automate the longwall system. The final cost benefit analysis of all of the automation areas indicated a total net national benefit (profit) of roughly $200 million to the longwall mining industry if all automation candidates were installed. This cost benefit represented an approximate order of magnitude payback on the research and development (R and D) investment. In conclusion, it is recommended that the shearer operation be automated first because it provides a large number of other sensor inputs required for face alignment (i.e., shields and conveyor). Automation of the shield and conveyor pan-line advance is suggested as the next step since both the shearer and face alignment operations contributed the greatest time delays to the overall system downtime.

19609 (DOE/ET/14180—T1) Acme Miner Bolter: design, assembly, and field testing. Final technical report, September 30, 1979-March 31, 1982. Myers, S.L. (Acme Machinery Co., Huntington, WV (USA)). Jan 1983. Contract AC01-80ET14180. 110p. NTIS, PC A06/MF A01. Order Number DE83006382.

The purpose of this report is to convey information and data concerning the manufacture, surface and underground testing of the Acme Miner Bolter under the Department of Energy Contract No. DE-AC01-80ET14180. The manufacture of the A.M.B. was completed in March 1982; and the machine was shipped to the DOE test facility in Bruceton, Pennsylvania, to undergo surface testing by cutting on a block of coalcrete in the Cutting Trials Area and taking data of the various functions. After completing the surface testing in May 1982, the A.M.B. was shipped to R and P Coal Company's Urling No. 3 Mine to undergo underground testing. primarily the A.M.B. was to mine 150 tons of coal per shift for five consecutive shifts. The A.M.B. satisfactorily completed this test on November 4, 1982. The general consensus of the people involved with the testing of the A.M.B. was that it was a valid coal mining concept. They also felt it should be further developed to obtain a production model.

19610 **(DOE/OR/20807—T1-Vol.2C) Tri-State Synfuels Project Commercial Scale Coal Test: Volume 2C. Collection and shipment photographic review.** (Tri-State Synfuels Co., Houston, TX (USA)). Jun 1982. Contract FC05-81OR20807. 94p. NTIS, PC A05/MF A01. Order Number DE83007444.

This report is a photographic review of the collection and shipment phase of the project during February through April 1981. It covers the locations at Morganfield and Uniontown, Kentucky; Darrow, Louisiana; and Port Elizabeth and Sasolburg, Republic of South Africa. The final detailed program planning and tour of the mine, belt and barge loading facilities occurred on February 11 and 12 (Section 2.0). The coal was ampled and selected from the Camp 1 mine at Morganfield (Section 3.0) and transported on the nine-mile conveyor belt to Uniontown, February 23-25 (Section 4.0). The coal was inspected and loaded at Uniontown on a 15-barge tow, February 23-25, for the 900-mile trip on the Ohio and Mississippi River systems to Darrow (Section 5.0). The barges were inspected and top sampled prior to transloading the bulk carrier M.S. Bonita at Darrow during March 17-20 for shipment to Port Elizabeth (Section 6.0). The ship was offloaded and rail cars sampled April 15-24 at Port Elizabeth before leaving for Sasolburg (Section 7.0). The rail cars were offloaded and partially sampled and trucked to Sasolburg in late April and stockpiled until the gasification test program started in July. After the July and September phases of the coal test, the remaining stockpile was relocated and compacted prior to the November tests to prevent spontaneous ignition.

19611 **(PB—83-115840) Development of lightweight hydraulic supports. Open file report Sep 78-May 82.** Alexander, P.T. (ESD Corp., Santa Clara, CA (USA)). May 1982. 94p. NTIS, PC A05/MF A01.

After evaluating preceding studies and designs of lightweight supports, the all-hydraulic and the hydromechanical concepts were selected for detailed design and fabrication. Further analysis and testing showed that the all-hydraulic design was economically justified and met all the crucial engineering, manufacturing, and design criteria identified during the evaluation. Following Bureau of Mines approval of the detailed design, four all-hydraulic support models were fabricated. When functional and structural testing was completed, 40 additional units were constructed and distributed for in-mine testing. The units were acceptable by all three demonstration mines. The widespread interest in supports for seam heights greater than 8 feet led to expansion of the design data package. Four basic models were designed to cover the new height range, but no hardware has yet been fabricated.

19612 **(PB—83-117887) Longwall mining principles for safely working steep coal seams. Open file report 3 Dec 79-30 Jun 81.** Adam, R.F.J.; Douglas, W.J.; Reese, B.J. (Ketron, Inc., Wayne, PA (USA)). 30 Jun 1981. 162p. NTIS, PC A08/MF A01.

This report summarizes the principles of safely working steep coal seams using longwall mining methods. The report presents the state of the art and identifies the problems that result from seam inclination. Details are given on foreign longwall faces achieving good records of safety and productivity when mining on 30 degrees to 50 degrees inclined seams. Recommendations for further research are suggested.

19613 **(SAND—82-2949) Subsidence prediction for high-extraction mining using complementary influence functions.** Sutherland, H.J.; Munson, D.E. (Sandia National Labs., Albuquerque, NM (USA)). Feb 1983. Contract AC04-76DP00789. 35p. NTIS, PC A03/MF A01. Order Number DE83007579.

Surface subsidence caused by high-extraction underground mining is described through complementary influence functions. The concept of complementary functions was introduced recently by Sutherland and Munson. This concept differs from other proposed concepts in that the surface displacement is the result of the combined contributions of mined and unmined zones. This approach eliminates computational difficulties experienced with the conventional influence functions to complex room-and-pillar configurations. The analysis framework is reported here in two forms. The first is for the complete complementary influence function formulation and the second is the degenerate case of the complementary influence functions applied to a longwall geometry. The former is solved analytically; the latter graphically. Both are illustrated with analyses of actual case histories. 13 figures, 3 tables.

19614 **Ten ways to reduce longwall dust.** Niewiadomski, G.E.; Jankowski, R.A.; Kissell, F.N. (US Bur of Mines, USA). *Mining Congress Journal;* 68: No. 8, 46-49, 76(Aug 1982).

The article gives ways to reduce dust. In addition the Bureau of Mines has undertaken a major joint effort with industry to identify and document technology that may eliminate the longwall dust problem.

0130 Transport And Handling

REFER ALSO TO CITATION(S) 19486, 19487, 19492, 19497, 19553, 19594, 19600, 19610, 19644, 19954, 21881

19615 **(DOE/ET/13350—T5) Characterization and evaluation of washability of Alaskan coal: selected seams from Northern Alaska, Chicago Creek, Unalakleet, Nenana, Matanuska, Beluga, Yentna, and Herendeen Bay coal fields. Final technical report for phase IV, August 1, 1980-January 31, 1982.** Rao, P.D.; Wolff, E.N. (Alaska Univ., Fairbanks (USA). Mineral Industry Research Lab.). Nov 1982. Contract FG22-78ET13350. 66p. NTIS, PC A04/MF A01. Order Number DE83007890.

Washability characteristics were determined for fifteen coal samples from the Northern Alaska, Chicago Creek, Unalakleet, Nenana, Matanuska, Beluga, Yentna and Herendeen Bay coal fields. The raw coal was crushed to 1 1/2 inches, 3/8 inch and 14 mesh top sizes, and float-sink separations were made at 1.30, 1.40 and 1.60 specific gravities. The results are given as follows: original percent ash, final percent ash and percent yields given. The coals were mostly subbituminous and bituminous. (LTN)

19616 **(DOE/ET/13350—T6) Characterization and evaluation of washability of Alaskan coals: selected seams from the Northern Alaska, Nulato, Eagle, Nenana, Broad Pass, Kenai, Beluga, and Chignik coal fields. Final technical report for phase III, March 1979-January 31, 1982.** Rao, P.D.; Wolff, E.N. (Alaska Univ., Fairbanks (USA). Mineral Industry Research Lab.). Nov 1982. Contract FG22-78ET13350. 69p. NTIS, PC A04/MF A01. Order Number DE83007891.

Washability characteristics were determined for fifteen coal samples from the Northern Alaska, Nulato, Eagle, Nenana, Broad Pass, Kenai, Beluga and Chignik coal fields. The raw coals were crushed to 1 1/2 inches, 3/8 inch and 14 mesh topsizes, and float-sink separations were made at 1.30, 1.40 and 1.60 specific gravities. The results are given as follows: original percent ash, final percent ash and percent yield; in some cases the original and final percent sulfur content are given. The coals were mostly subbituminous and bituminous. (LTN)

19617 **(DOE/NBM—3008223) Gas-solid transport flow regimes: design and measurement.** Klinzing, G.E.; Mathur, M.P. (Department of Energy, Pittsburgh, PA (USA). Pittsburgh Energy Technology Center). 1980. 14p. NTIS, PC A02/MF A01. Order Number DE83008223.

The transport in gas-solid systems from the dilute to the extrusion flow regimes is reviewed. The troublesme dense phase regime is considered and design recommendations are given for each flow case. The homogeneous dense phase flow regime with loading from 10 to 50 is analyzed and a pressure drop relationship is presented. The mass flow measurements of the gas-solid system are studied using three meters that do not distort the flow stream because they are not inserted into it. Varying degrees of reliability are seen for these flowmeters.

19618 **(DOE/NBM—3008225) Recent developments in coal preparation in the USA.** Killmeyer, R.P.; Miller, K.J.; Deurbrouck, A.W. (Department of Energy, Pittsburgh, PA (USA). Pittsburgh Mining Technology Center). 1981. 14p. NTIS, PC A02/MF A01. Order Number DE83008225.

As the value of coal and, therefore, the importance of coal preparation, have grown in the US in the last few years, so have the sophistication and efficiency of preparation plant circuitry. Until a few years ago, most preparation plant flowsheets were relatively simple, with jigs or heavy-media for the coarse and intermediate size coal, and flotation for the fine coal. The coal flotation circuits were usually single-stage using open-trough or flow-through flotation cells, and reagent (usually frother only) was added directly into the feedbox of each flotation cell bank. In many plants, particularly where lower-rank coals or steam coals were washed, the fines were discarded to refuse or were recovered without cleaning. But in recent years, a number of preparation plants have been built with more flexible and complex circuitry utilizing various parallel circuits, multi-stage cleaning, split-feed flotation, and the capability of cleaning to finer sizes by specific gravity separation methods. To illustrate the changing trends in US coal preparation practice, this paper will review several new preparation plant flowsheets and fine coal circuits, as well as new processes and preparation plant design concepts.

19619 (DOE/NBM—3008423) **Oxydesulfurization of coal and sulfur-containing compounds.** Warzinski, R.P.; LaCount, R.B.; Friedman, S. (Department of Energy, Pittsburgh, PA (USA). Pittsburgh Energy Technology Center). 1980. 28p. NTIS, PC A03/MF A01. Order Number DE83008423.

The susceptibility of sulfur in coal to oxidative removal varies with the nature of sulfur-containing species. The inorganic compounds, primarily pyrite, marcasite, and iron sulfate, are amenable to removal by a variety of methods; the organically bound sulfur, however, is more diffucult to remove and exhibits varying degrees of resistance depending on its chemical environment. The extent and efficiency of organic sulfur removal from coal by air/water oxydesulfurization has been investigated and appears to depend on the type of coal and severity of treatment used. In general, higher rank coals exhibit more resistance to treatment than lower rank coals; however, the accompanying loss in heating value is greater for the latter. Similar treatment of sulfur-containing model compounds further illustrates the relative susceptibilities of different chemical species to oxidation. Extrapolation of these data to the treatment of coal is a first step in the elucidation of the complex chemistry involved. Combinations of chemical desulfurization, physical cleaning, and flue gas desulfurization are considered briefly. It is concluded that the greatest demand for chemically cleaned coal may be from industrial boilers since the cost of flue gas desulfurization rises sharply as the size of the installation decreases. (LTN)

19620 (DOE/PC/42295—T6) **Gravimelt process development. Quarterly technical progress report.** (TRW Energy Development Group, Redondo Beach, CA (USA)). 20 Feb 1983. Contract AC22-81PC42295. 10p. NTIS, PC A02/MF A01. Order Number DE83006962.

During the current reporting period, the Mod 2, bench-scale Gravimelt reactor was installed, shaken down and operated using a sample of 40% ash run of mine Pittsburgh No. 8 seam coal which had been mine cleaned to a level of 10.3% ash. Operation was successful and an excellent overall mass balance was achieved. Preliminary ash analyses from the test site show the above 97% ash removal calculated from run of mine was obtained as expected from previous laboratory scale tests. Large processed coal samples, prepared during the week of round-the-clock operation, were obtained for the planned washing studies and other protect requirements. 3 tables.

19621 (ICTIS/M—0152) **Beneficiation of Stockton coal by dense-media processes using organic parting liquids. Preliminary tests of prototype.** (Coal Research Association of New Zealand, Wellington). Sep 1982. 12p. Coal Research Association of New Zealand, Wellington.

Preliminary tests are described in the use of organic parting liquids in dense-media separation, for possible application to the beneficiation of Stockton coal (for use in anode-carbon manufacture). A small prototype separating chamber was fabricated. Tests carried out indicate that, with a feed of + 100 mesh coal containing about 0.9% ash, and with a parting-liquid specific gravity of 1.32, a 92.5% yield of 'floats' containing 0.25% ash could be obtained. Some ideas for commercial operation are presented.

19622 (PB—82-239732) **Review of the commodity flow studies (1975-1979).** Pike, J.; Gandham, B. (Newcastle upon Tyne Univ. (UK). Transport Operations Research Group). Sep 1981. 57p. (RR—36). NTIS, PC A04/MF A01.

The purpose of the study was to: Establish a data-base relating to the flows of a limited number of important commodities in terms of their origins, destinations, modes, packaging and handling characteristics; consider changes affecting the provision of transport within the commodities; and consider changes affecting the generation of flows and demand for the chosen commodities. The following nine commodities were selected for study: Iron Ore, Coal, General Steels, Petroleum Products, Bricks, Milk, Beer, Paper and Sugar. It was decided to concentrate upon the primary flows within these commodities i.e. flows from the point of production to redistribution depots, ports or manufacturing plants, rather than their detailed distribution to consumers.

19623 (PB—82-256595) **Distributing the risks of interbasin water transfers under drought conditions: the dilemma posed by coal slurry pipelines.** (Teknekron, Inc., Berkeley, CA (USA)). Mar 1982. 215p. NTIS, PC A10/MF A01.

Problems are examined concerning the use of western water to transport coal in slurry pipelines from mines to generating facilities during western water shortages. Potential water shortage risks to the parties-at-interest were identified and reviewed. It was found that, while each of three pipelines considered originates in an arid western state (Wyoming, Colorado, Utah), the water availability level, water use for irrigation, and the likelihood of local water shortages in the surrounding community varies considerably in each locale. The risks associated with western water use for pipelines fall heaviest on agricultural users who might need such water during water shortage periods.

19624 (PB—83-135509) **Pacific Bulk commodity Transportation System, phase III. Volume IV: marad/Boeing study. Final report.** (Boeing Engineering and Construction, Tukwila, WA (USA)). Sep 1981. 170p. NTIS, PC A08/MF A01.

Projections are developed for comparative costs in Japan in 1987 from imported oil and Utah coal transported to Japan by means of the Pacific Bulk Commodity Transportation System. Cost projections are derived from underground mining models and transportation systems for oil and coal utilizing inflation factors derived from economic projections to 1987. Japanese goals for steam coal imports from United States between 1985 and 1990 are described. Overland transportation costs and limited U.S. west coast port capacity are identified as obstacles to U.S.A. reaching this share. Methods of increasing pipeline throughput during startup are described and strategies for replenishment of storage basins at the U.S. terminal and at the overseas coal center are defined. Economics of a Japanese distribution system is analyzed based on the concept of a coal center serving four power plants; two by pipeline and two 150 miles distant served by pusher barge fleet. Comparisons are provided of relative costs of distributing coal in all slurry, solid coal, and a mixed mode systems. Trends in underground coal mine productivity in Utah are analyzed. Possible delays in design and construction of the Pacific Bulk Commodity Transportation System are reviewed.

19625 **Economic tradeoffs between flue gas desulfurization and coal cleaning.** Thomas, T. (Battelle, Columbus Lab, OH, USA). *Coal Technology;* 139-154(1981). (CONF-8111140—).

From 4. international coal utilization conference; Houston, TX, USA (17 Nov 1981).

Physical coal cleaning has been evaluated frequently for its use in supplementary SO_2 control. The existing studies examine differing issues and show differing conclusions. This paper addresses all of the known potential benefits to be had from coal cleaning. In the example quantification, there are two major benefits to be had FGD savings and systems availability. Together these two benefits alone may justify the use of coal cleaning, depending upon site specific data. 5 refs.

0140 Combustion

REFER ALSO TO CITATION(S) 19684, 19748, 19934, 20242, 20245, 20258, 20262, 20263, 20264, 20285, 21301, 21422, 21451

19626 (ANL/FE—80-10-Add.) **Sulfur control in fluidized-bed combustors: methodology for predicting the performance of limestone and dolomite sorbents. Addendum. Compilation of sorbent performance data from atmospheric fluidized-bed combustors.** Fee, D.C.; Myles, K.M.; Wilson, W.I.; Fan, L.S.; Smith, G.W.; Wong, S.H.; Shearer, J.A.; Lenc, J.F.; Johnson, I. (Argonne National Lab., IL (USA)). Sep 1982. Contract W-31-109-ENG-38. 99p. NTIS, PC A05/MF A01. Order Number DE83007659.

This addendum contains tabulated experimental data on sorbent utilization in fluidized-bed combustors. The data were extracted from a review of literature, dealing mainly with combustors greater than 18-in. in diameter. The tables include data on experimental variables, sorbent properties, coal properties, and the physical arrangement of the combustor. The format is designed to minimize the amount of data which must be entered for each experiment by making extensive use of libraries of the information, each common to many individual experiments. (LCL)

19627 (BNL—51596) **Coal-oil mixtures: an alternative fuel for the commercial sector. Annual report, fiscal year 1981.** Butcher, T.; Krishna, C.R.; Saunders, J. (Brookhaven National Lab., Upton, NY (USA)). Aug 1982. Contract AC02-76CH00016. 77p. NTIS, PC A05/MF A01. Order Number DE83008472.

Results are presented from a program aimed at identifying the hardware systems required for the implementation of coal-oil mixtures (COM) as a substitute boiler fuel in the commercial sector. Components for a COM burner system were evaluated both in a cold burner system test stand and a small cast iron boiler fitted with a modified retention head burner. Control valves, pumps, atomizers, and strainers were selected and combustion trials were conducted. Results are presented on thermal efficiency and particulate emissions. Agitation of a commercial sector fuel storage tank with a slurry recirculation system has been evaluated through model tank tests. The most successful arrangement tested was a set of six nozzles aimed across the tank floor. A fully settled slurry in the model tank has been resuspended in three hours and maintained at 98% suspension. Tests were also conducted in a 3800 liter (1000 gallon) vertical tank with a propeller agitator where it was shown that the slurry can be easily resuspended. In routine operation an agitator fractional on-time of about 10% may be adequate. An evaluation of the economics of conversion to COM in the commercial sector is presented. Conversion is currently attractive if a cyclone dust collector can be used for pollution control.

19628 (CONF-800878—, pp 233-247) **Fluidized bed combustion: an overview of design and operations.** Patterson, R.M. (Davy McKee Corp., Cleveland, OH). 1980. Univ. of Pittsburgh, Dept. of Chemical and Petroleum Engineering, Pittsburgh, PA 15261.

From 7. annual international conference on coal gasification, liquefaction, and conversion to electricity; Pittsburgh, PA, USA (5 Aug 1980).

Fluidized bed combustion (FBC) is an environmentally sound and energy efficient approach to burning a wide variety of fuels. With decreasing and unsure supplies of liquid and gaseous fuels, FBC has lately received attention as a commercial solid fuel combustion technology. This paper presents an overview of state-of-the-art of fluidized bed combustion technology. The FBC process is described in the first section. Following this, commercial suppliers (or potential suppliers) of FBC systems are listed, and the design parameters of available product lines are briefly reviewed. Data from operating units is then presented; and, finally, the economics of FBC versus competing technologies is reviewed. The theoretical advantages of fluidized-bed combustion are: utilization of high sulfur fuels without flue gas treatment, reduced combustion temperature, reduced NO/sub x/ emissions, reduced excess air requirements, reduction of combustor size, increased heat transfer to the working fluid, fuel versatility, compact modular unit, package construction of units, and easy-to-handle by-product material. Generally, these advantages are a result of (1) intense turbulence within the fluidized bed and (2) long particle residence time in the bed without a correspondingly long linear flow path requirement. A wide range of fuels may be used: gases, fuel oils, coal of all ranks, coal mine wastes, organic wastes, to name several. In theory, the fluidized-bed combustor will operate on any fuel which has a net calorific value greater than its sensible heat at the bed temperature. Perhaps the outstanding advantage of FBC is the ability to burn high sulfur coals in an environmentally acceptable manner without the need for auxiliary SO_2 control equipment.

19629 (CONF-800878—, pp 248-265) **Preliminary results from the DOE coal-oil mixture demonstration at Salem Harbor.** Dunn, R.M. (New England Power Service Co., Westborough, MA). 1980. Univ. of Pittsburgh, Dept. of Chemical and Petroleum Engineering, Pittsburgh, PA 15261.

From 7. annual international conference on coal gasification, liquefaction, and conversion to electricity; Pittsburgh, PA, USA (5 Aug 1980).

An 80 MW coal fired boiler which had been converted to burn No. 6 oil in 1969 was equipped with new burners and accessories to burn coal-oil mixture. A description of the 30% coal and 70% oil mixture preparation facility is given. Results of initial coal-oil mixture (COM) blending, combustion and stack emission tests are presented along with a discussion of initial startup problems encountered. EPRI will support an expanded boiler performance test program designed to yield information which may be utilized in the conversion of oil fired designed to COM. Recommendations are made for additional COM research and product development to improve reliability.

19630 (CONF-800878—, pp 266-277) **Operating Florida Power and Light Company's Sanford Plant on coal-oil mixture.** Cook, M.C. (Florida Power and Light Co., Miami). 1980. Univ. of Pittsburgh, Dept. of Chemical and Petroleum Engineering, Pittsburgh, PA 15261.

From 7. annual international conference on coal gasification, liquefaction, and conversion to electricity; Pittsburgh, PA, USA (5 Aug 1980).

On April 20, 1980, Florida Power and Light began burning a coal-oil mixture (COM) at its Sanford Power Plant. We believe that mix, which contained 10% by weight coal, was the first COM ever burned in a utility power plant which had originally been designed to be fired with oil. Since April, FPL has continued its Sanford COM experiment, gradually increasing the proportion of coal in the mix. As of August 1, 1980, FPL had successfully burned a COM fuel containing as much as 40% coal. In the weeks ahead, the concentration will gradually be increased to 50%, and we hope to conduct sustained combustion tests at that level. Initial results are encouraging.

19631 (CONF-8104107—10) **Fluidized-bed boiler: an industrial application at Central Soya Company, Inc., Marion, Ohio.** Vince, A.N.; Barnhart, R.D. (Central Soya Co., Inc., Fort Wayne, IN (USA)). 1981. 17p. Central Soya Company, Inc., Fort Wayne, IN 46802.

From 20. annual Kentucky industrial coal conference; Lexington, KY, USA (29 Apr 1981).

The Marion installation has demonstrated that a fluidized-bed has good application to medium-sized industries. Operational problems experienced are to be expected in any new design, and solutions can probably be found. Four significant advantages over a conventional coal-fired unit seem to be the lower capital cost of the packaged design, an increased boiler efficiency, low NO/sub x/ emissions, and a low SO_2 emission factor. Central Soya is currently investigating fluidized-bed units for replacement of large, gas/oil-fired boilers at another location.

19632 **(DOE/NBM—3008206) Industrial firing of coal-oil mixtures.** Bergman, P.D.; George, T.J.; Joubert, J.I.; Bienstock, D. (Department of Energy, Pittsburgh, PA (USA). Pittsburgh Energy Research Center). [nd]. 25p. NTIS, PC A02/MF A01. Order Number DE83008206.

COM utilization can displace as much as 40 to 45% of the oil consumed in an industrial facility, and at the same time permit the user to keep much of his oil-burning steam generation and process equipment intact with a modest degree of retrofitting. Those industries which have the necessary capital, technical experience, and lead-time to burn coal directly should proceed to do so. For those users less versed in the art who wish to gradually introduce coal into their plant fuel economy, COM firing should be explored as an alternative. A preliminary economic evaluation of the costs of retrofitting industrial boilers presently consuming No. 6 residual oil to COM-firing proved favorable. For existing boiler facilities of capacity 100,000 to 500,000 lb steam/hr, and assuming total capital charges of 25%, conversion costs of $2.14 to $2.49/10^6 Btu were estimated, depending uon whether the slurry fuel was prepared on-site or off-site. Coal was priced at $27 per ton and 1% S residual oil was purchased for $2.17/10^6 Btu. When the COM was manufactured in a large plant (30 million barrels per year) rather than a small plant (1 million barrels per year), the cost of COM declined from $2.10 to $1.84/10^6 Btu fired. The idea of introducing a different fuel concept into established markets poses very complex technical and economic problems. However, further studies of this nature should prove valuable in defining potential future markets for COM combustion.

19633 **(DOE/NBM—3008222) Settling characteristics of coal-oil mixtures and some model systems.** Klinzing, G.E.; Ekmann, J.M. (Department of Energy, Pittsburgh, PA (USA). Pittsburgh Energy Technology Center). [nd]. 26p. NTIS, PC A03/MF A01. Order Number DE83008222.

The use of coal-oil mixtures as a combustion fuel has a great potential for meeting a large fraction of our energy demand. The stability of these mixtures, that is, maintaining a homogeneous solid-liquid suspension, is vital. The settling properties of these mixtures has been studied by use of a system of ultrasonic sensors. In addition, model coal and oils have been employed to study the pure physics of the settling phenomena. The sedimentation theory of Smiles which relies on unsteady state diffusion analogies has been successful in modeling both the coal oil mixtures and the model systems. Pseudo diffusion coefficients have been determined and their dependence on various parameters have been found.

19634 **(DOE/NBM—3008448) Combustion of coal-oil mixtures in a 700-HP watertube boiler.** Pan, Y.S.; Bellas, G.T.; Mathur, M.P.; Bienstock, D. (Department of Energy, Pittsburgh, PA (USA). Pittsburgh Energy Technology Center). [nd]. 39p. NTIS, PC A03/MF A01. Order Number DE83008448.

Coal-oil mixtures containing up to 50 percent coal by weight have been successfully burned in a 700 HP watertube boiler, designed for oil firing, with no derating occurring. Carbon-conversion efficiencies were above 98 percent, and boiler efficiencies were the same as when firing No. 6 fuel oil. Combustion tests were conducted with No. 6 fuel oil mixed with Pittsburgh Seam coal pulverized to a coal particle size of 90 percent minus 200 mesh. Test results related to boiler performance, pollutant emissions, and ash deposition are presented. The equipment, instrumentation, and data acquisition system of the combustion test facility are described. The modest changes required to adapt the facility designed for oil firing to utilize coal-oil mixtures are discussed. Additional combustion tests needed to assess bottom-ash accumulation and the corrosion, erosion, and fouling behavior inherent in the long-duration operability of coal-oil mixtures in an oil-fired boiler are underway.

19635 **(DOE/PC/40267—3) Combustion characterization of coals for industrial applications. Third quarterly progress report, 1 October 1982-31 December 1982.** ya Nsakala, N.; Patel, R.L.; Lao, T.C. (Combustion Engineering, Inc., Windsor, CT (USA)). Feb 1983. Contract AC22-81PC40267. 13p. NTIS, PC A02/MF A01. Order Number DE83007515.

Primary stage stoichiometries of 15, 30, 50, 60, 70, 90 and an unstaged baseline test were employed. The effect of the primary stage stoichiometry on NO/sub x/ formation is presented in Figure 3. Results indicate the maximum NO/sub x/ reduction is at a primary stage stoichiometry of about 50%. Single stage baseline emissions were 498 ppM compared to the optimum NO/sub x/ emissions of 282 ppM from a premixed first stage stoichiometry of 50%. In other words, 43% NO/sub x/ emission reduction was obtained in the CMHF at 20% overall excess air level. The optimum primary stage stoichiometry for NO/sub x/ emissions can be explained as follows: During the combustion process, some fuel nitrogen forms volatile nitrogen species and some remains in the char. In an oxygen deficient primary stage, some volatile nitrogen will remain in as intermediate species such as HCN, CN, and NH/sub x/, some will react with oxygen to form nitrogen oxide (NO). The intermediate species can either be oxidized to NO/sub x/ in the secondary stage or react with NO to form harmless molecular nitrogen (N_2). If the primary stage is too air rich, these intermediate species will react with oxygen to form NO/sub x/. If, on the other hand, the primary stage is too fuel rich, most of these intermediate nitrogen species will remain unreacted since there is not enough oxygen or NO to react with. They, however, will be oxidized to NO/sub x/ in the secondary stage where oxygen becomes available. Therefore, an optimum primary stage stoichiometry exists, which provides an optimum amount of NO and intermediate nitrogen species favoring NO to N_2 conversion in the primary stage. The effect of excess air on NO/sub x/ emissions at the outlet of the furnace is shown in Figure 4. Results indicate that NO/sub x/ increases slowly with increasing excess air.

19636 **(DOE/PC/40280—T7) Parametric performance studies on fluizied-bed heat exchangers. Task 2. Experimental evaluation of multi-stage beds. Technical progress report, August 1, 1982-Decmber 31, 1982.** Stoeffler, R.C. (United Technologies Research Center, East Hartford, CT (USA)). Feb 1983. Contract AC22-81PC40280. 31p. (R—83-915729-24). NTIS, PC A03/MF A01. Order Number DE83007080.

Analyses and experiments have been made to investigate the heat transfer characteristics of single and multi-stage shallow fluidized bed heat exchangers for application to the recovery of heat from sources such as waste heat, and coal combustion or gasification. The work, conducted under Contract DE-AC22-81-PC40280 is an extension of that done previously under Contracts EC-77-C-03-1433 and DE-AC03-79-ET11348 and consists of two tasks; in Task 1, tests were conducted to investigate the effects of liquid condensate fouling on fluidized bed heat exchanger performance. The results obtained in these experiments have been reported in Reference 1. In Task 2, tests have been conducted to investigate the performance of fluidized beds which are staged using a baffle plate. In these tests, heat transfer performance in the baffle supported fluidized bed was equivalent to the enhanced performance achieved in beds supported by distributor plates. Since the open area of the baffle plate is large compared to that of the distributor plate, the pressure loss of the baffled two-stage heat exchanger was significantly less than the pressure loss for a two-stage heat exchanger having two distributor plates. The test results indicated that the amount of recirculation of bed material between the two beds was small, and the heat transfer effectiveness of staging with baffles would approach that of staging with distributor plates.

19637 **(DOE/PC/50261—T1) Investigate the effectiveness of calcium-treated coals in the capture of sulfur gases generated in staged fired combustors. First quarterly technical progress report, October 1, 1982-January 1, 1983.** Porter, J.H.; Manning, M.P.; Benedeck, K. (Energy and Environmental Engineering, Inc., Cambridge, MA (USA)). 1 Feb 1983. Contract AC22-82PC50261. 40p. NTIS, PC A03/MF A01. Order Number DE83006839.

During the first quarter's effort to Investigate the Effectiveness of Calcium Treated Coals in the Capture of Sulfur Gases Generated in Stage Fired Combustors, the following work has been done: (a) Task 1, the Literature Survey has been completed; (b) Task 2, Design and Construction of the Combustion Test Facility, has progressed significantly; and (c) Task 3, the Development of Calcium-Fixation Procedures, has been initiated. From Task 1, it was found that few articles have been published concerning calcium-fixation methods and sulfur-retention studies on calcium fixed coals. With respect to Task 2, a low-flow coal feeder and a char/

gas collection probe have been designed. The furnace for the combustion studies (a vertical-tube laminar-flow furnace) has been ordered and modifications of the furnace have been designed. Basic laboratory preparations are underway to commence Task 3. 6 figures, 2 tables.

19638 (EUR—7633-d,e,f,i, pp 283-289) **Evaluation of the flammability of coals low in volatile matter.** Chauvin, R. 1982. (In French). Commission of the European Communities, Luxembourg.

In Round table meeting on chemical and physical valorisation of coal.

The ease with which coal particles ignite in pulverized coal furnaces determine ignition distance and the stability of the flame, the conditions producing ignition which largely affect the subsequent combustion sequence. Knowledge of this characteristic additionally provides valuable guidance in selecting the coals which can be used in a furnace of given characteristics. The flammability of four anthracites of diverse origin was determined directly using a rapid-heating radiation furnace. Significant differences in flammability among the four coals was found and, more importantly, there was no correlation with the content of volatile matter.

19639 (N—8229376) **Plane flame furnace combustion tests on JPL desulfurized coal.** Reuther, J.J.; Kim, H.T.; Lima, J.G.H. (Pennsylvania State Univ., University Park (USA); Jet Propulsion Lab., Pasadena, CA (USA)). May 1982. 73p. (NASA-CR—169199). NTIS, PC A04/MF A01.

The combustion characteristics of three raw bituminous (PSOC-282 and 276) and subbituminous (PSOC-230) coals, the raw coals partially desulfurized (ca -60%) by JPL chlorinolysis, and the chlorinated coals more completely desulfurized (ca -75%) by JPL hydrodesulfurization were determined. The extent to which the combustion characteristics of the untreated coals were altered upon JPL sulfur removal was examined. Combustion conditions typical of utility boilers were simulated in the plane flame furnace. Upon decreasing the parent coal voltaile matter generically by 80% and the sulfur by 75% via the JPL desulfurization process, ignition time was delayed 70 fold, burning velocity was retarded 1.5 fold, and burnout time was prolonged 1.4 fold. Total flame residence time increased 2.3 fold. The JPL desulfurization process appears to show significant promise for producing technologically combustible and clean burning (low SO3) fuels.

19640 (PB—82-206715) **Achieving the best from boiler, through understanding Indian coal.** Sarkari, T.R. (Ahmedabad Textile Industry's Research Association (India)). Aug 1979. 53p. NTIS, PC A04/MF A01.

This report gives a basic understanding of coal and its behavior to industrial users so that they can use coal properly. The basic structure and properties of coal are listed. Special emphasis is given to the problems posed by coal quality and the measures to solve these problems. Also discussed in the report is to what extent caking coal, fines, high ash coal, low fusion coal, and undesirable alkaline impurities in coal affect boiler output.

19641 (PB—82-232380) **Prospects for increasing the direct use of coal in industrial boilers. Final task report Nov 79-Nov 80.** Bergman, M.K.; Dykes, R.M. (Environmental Protection Agency, Research Triangle Park, NC (USA). Industrial Environmental Research Lab.). Jun 1982. 320p. NTIS, PC A14/MF A01.

The report gives a comprehensive evaluation of factors (environmental, technical, economic, and institutional) influencing solid coal use in industrial boilers. Trends in coal use, recent legislative warrants, and technical and logistic problems in coal use at industrial plants are reviewed. Demographic aspects of the existing industrial boiler population are examined, and regional patterns in fuel consumption, boiler deployment, and the location of major energy consuming industries are identified. Six technologies and five alternate groups of the technologies are compared to the year 2000 on the basis of resource requirements and emissions. Technologies considered are conventional combustion in both a spreader-stoker boiler and with flue-gas desulfurization, fluidized-bed combustion, low-Btu gasification, and physical coal cleaning (alone and combined with the above technologies). Air emissions are further assessed from the perspective of existing air quality problems in industrial areas. Capital and annual costs for each technology are also compared. Sensitivity analysis is included to detail the extent to which varying operating parameters affect steam cost. Fuel choices are evaluated on industry- and region-specific bases. Finally, results of analyses are interpreted from the perspective of achieving environmental and energy goals.

19642 (SAND—82-8035) **Application of complex equilibrium calculations to the study of mineral matter during coal combustion.** Carling, R.W.; Mar, R.W.; Nagelberg, A.S. (Sandia National Labs., Livermore, CA (USA)). Feb 1983. Contract AC04-76DP00789. 29p. NTIS, PC A03/MF A01. Order Number DE83007050.

Complex thermodynamic calculations are potentially useful for the study of the complex chemistry associated with mineral matter evolution during coal combustion. However, one must be cognizant of the caveats, limitations, and assumptions before relying on the computed results. In this report, the effects of three factors on the computed results were examined: accuracy of the thermochemical data, species considered in the calculations, and condensed phase solution formation. The qualitative behavior of species was found to be fairly insensitive to errors in the data and solution effects; however, the absolute concentration of species may vary significantly. It was seen that the selection of species for consideration may have a significant effect on the quantitative and qualitative behavior of the computed results. In assessing the state of the art of computational techniques, and future needs, it is concluded that the technology is available to make the sophisticated calculations that are required. However, additional insight is needed on the rates and mechanisms of mineral matter decomposition, and a more complete thermochemical data base is required to make equilibrium calculations. 10 figures, 1 table.

19643 **Report to the IEA AFBC technical meeting at Petten, Netherlands, May 1982: TNO's environmental program on fluidized bed combustion.** van Duin, P.J. Hague, Netherlands; Netherlands Organization for Applied Scientific Research TNO (1982). 15p. (P—82/13; CONF-8205153—1). TNO, P.O. Box 217, Delft, Netherlands.

From IEA/AFBC technical meeting; Petten, Netherlands (1 May 1982).

TNO carries out an environmental research program on fluidized bed combustion of coal. Tests are executed with a 4MW experimental atmospheric fluid bed boiler. To reduce the emission of sulfur dioxide, coal is mixed with limestone. The limestone turned out to be used partially, due to the formation of a calcium sulfate layer on the surface of the limestone particles. This conclusion was confirmed by X-ray mapping. Fly ash was investigated on harmful properties. When collected at low temperatures fly ash showed substantial genotoxicity.

19644 **Development of coal-water slurries as boiler fuel.** Henderson, C.B.; Scheffee, R.S.; McHale, E.T. (Atl Res Corp, Alexandria, VA, USA). *Coal Technology;* 251-265(1981). (CONF-8111140—).

From 4. international coal utilization conference; Houston, TX, USA (17 Nov 1981).

The development of slurries of coal and water as a boiler fuel replacing No. 6 fuel oil has been actively pursued at the Atlantic Research Corporation since 1976. Funding for this effort has been provided by the U.S. Department of Energy, the Electric Power Research Institute and by corporate funds. The name ARC-Coal has been selected for these slurries. Stable coal-water slurries with bond-dry coal loadings between 62% and 77% have been prepared, evaluated rheologically, and successfully burned in a one-million BTU/hr experimental furnace without the assistance of other fuels. The advantages, market, and economic factors of coal-water slurries are discussed. The properties of these slurries, including combustion results are reviewed. Also discussed is the pilot line used for processing barrel quantities of fuel and a pilot plant capable of processing 600 bbl/day, scheduled to go into operation in June, 1982. The goal of developing a slurry which can be pumped over considerable distances through a pipeline and also be burned as a fuel is suggested. 5 refs.

19645 **New AFBC coal-fired steam generation facility for the Idaho Chemical Processing Plant.** Cowart, F.C. (Exxon Nucl Idaho Co, Idaho Falls, USA). *Coal Technology;* 53-67(1981). (CONF-8111140—).

From 4. international coal utilization conference; Houston, TX, USA (17 Nov 1981).

A 135,000 lb/hr atmospheric fluidized bed combustion (AFBC) Coal-Fired Steam Generation Facility is to be built at the Idaho Chemical Processing Plant (ICPP) within the Idaho National Engineering Laboratory. The facility at ICPP will be the first AFBC unit in the United States to burn low sulfur (sub-bituminous) western Coal. The paper discusses engineering studies performed, environmental considerations, use of low sulfur coal, method of contracting, performance specifications, plant description, and the current project status. 3 refs.

0150 Marketing And Economics

REFER ALSO TO CITATION(S) 19425, 19426, 19489, 19494, 19538, 19672, 19691, 19710, 19711, 19718, 19719, 20805

19646 (CONF-800878—, pp 444-456) **Problems and rewards in building national self-sufficiency in energy.** Stegmann, J.A. (South African Coal, Oil, and Gas Corp., Ltd. (SASOL), Sasolburg). 1980. Univ. of Pittsburgh, Dept. of Chemical and Petroleum Engineering, Pittsburgh, PA 15261.

From 7. annual international conference on coal gasification, liquefaction, and conversion to electricity; Pittsburgh, PA, USA (5 Aug 1980).

There are a number of factors favouring synfuel production in South Africa: first of all, there are suitable coal fields in the immediate vicinity of our main industrial area. The basic infrastructure for the establishment of synfuel plants therefore already exists and the market is close by. Secondly, nature has given us relatively favourable geological conditions permitting highly mechanized extraction techniques so that coal can be delivered to the synfuel plants at Secunda at a cost - including return on capital - of less than $10.00 per ton, based on 1980 price levels. Thirdly, because the industry and its natural market are remote from the coast, it enjoys some transport protection against products refined from imported crude oil. But what is even more important than these inherent economic advantages enjoyed by us in South Africa, is that we realized a long time ago that in trying to close the gap between the cost of synfuels and international oil prices, one is confronted with a moving target which can more effectively be attacked sooner rather than later. The classic method of project evaluation uses discounted cash flow techniques which place a very high premium on cash flow during the early years of a project and very little on cash flow during later years. This technique can be quite inappropriate when evaluating the economics of highly capital intensive synfuel projects, particularly if the calculations are based on frozen cost and price levels.

19647 **(DOE/EIA—0008(81/4Q)) Energy information report to Congress: quarterly report. Fourth quarter, 1981.** (Department of Energy, Washington, DC (USA). Energy Information Administration). Mar 1982. 44p. NTIS, PC A03/MF A01. Order Number DE83008061.

This report was prepared in response to the mandate of Congress set forth in Public Law 93-319, Section 11 (c) (2), that requires for each calendar quarter a report that contains energy information including imports of crude oil, petroleum products, natural gas, and coal; reserves and production of crude oil, natural gas, and coal; refinery activities; and petroleum inventories.

19648 **(DOE/EIA—0008(82/1Q)) Energy information report to Congress: quarterly report. First quarter, 1982.** (Department of Energy, Washington, DC (USA). Energy Information Administration). Jun 1982. 45p. NTIS, PC A03/MF A01. Order Number DE83008060.

In response to the mandate of Congress set forth in Public Law 93-319, Section 11 (c) (2), that requires for each calendar quarter this report contains energy information including imports of crude oil, petroleum products, natural gas, and coal; reserves and production of crude oil, natural gas, and coal; refinery activities; and petroleum inventories.

19649 **(DOE/EIA—0035(82/10)) Monthly energy review.** (Department of Energy, Washington, DC (USA). Energy Information Administration). Oct 1982. 112p. NTIS, PC A06/MF A01. Order Number DE83008010.

An overview of statistical data is presented for production, consumption, imports and exports. (PSB)

19650 **(DOE/EIA—0121(82/1Q)) Quarterly Coal Report, January-March 1982.** (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Aug 1982. 82p. NTIS, PC A05/MF A01. Order Number DE83008048.

This report, provides comprehensive information about coal production, exports, imports, receipts, consumption, and stocks in the United States. The United States produced 218.7 million short tons of coal during the first quarter of 1982. This production total surpasses by 2.2 percent the amount produced during the first quarter of 1981. The United States exported 25.6 million short tons of coal during the first quarter of 1982. This exceeds by 14.8 percent the amount, 22.3 million short tons, exported during the same quarter of the previous year. The price of coal exports averaged $57.93 per short ton during January-March of 1982, $50.21 during those three months of 1981. US coal receipts at all end-use sectors during the first quarter of 1982 totalled 177.2 million short tons, 6.1 percent less than in the first quarter of 1981. Coal consumption during the first quarter of 1982 dropped slightly (0.1 percent) from the first quarter of 1981: 187.0 million short tons compared to 187.3 million. Total US coal stocks rose 1.5 percent to 212.6 million short tons on March 31, 1982, primarily due to an increase of 9.3 million short tons (38.6 percent) in coal stocks held by US coal producers and distributors. Coal production in 1982 is projected to be 883.6 million short tons, up 7.7 percent from the 1981 level of 820.1 million short tons. Domestic coal consumption is projected to rise from its 1981 level of 732.2 million short tons by only 1.9 percent, to 745.9 million short tons in 1982. Given that the economic recovery is projected not to begin until late 1982, coking coal consumpton is not expected to increase significantly until the fourth quarter of 1982.

19651 **(DOE/EIA—0121(82/2Q)) Quarterly coal report, April-June 1982.** (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Oct 1982. 81p. NTIS, PC A05/MF A01. Order Number DE83007995.

This report provides comprehensive information about coal production, exports, imports, receipts, consumption, and stocks in the United States. Evidence of the Nation's economic slump was reflected by coal statistics for the second quarter of 1982. Except for a continued high export volume, all quarterly indicators showed depressed coal market conditions. Second quarter data revealed: the largest decline in quarterly coal consumption in recent years; receipts exceeding demand requirements by wide margins; near-record stockpiling of coal by consumers and by producers and distributors; lower-than-normal coal consumption at electric utilities; sharply reduced coke production; continued high export levels; and moderate increases in coal prices. The United States produced 213.8 million short tons of coal during the second quarter of 1982, 2.3% less than in the first quarter. US coal exports totaled 31.6 million short tons during the second quarter of 1982. During the first half of the year they reached a record 57.2 million short tons, 33.6% above last year's level. Domestic coal receipts in all end-use sectors exceeded requirements, particularly at electric utilities, which are predominantly tied to long-term contracts with take-or-pay provisions. The average price of steam coal at electric utilities and other industrial plants rose to $35.31 per short ton (a 1.7% increase) and $41.78 per short ton (a 1.6% increase), respectively. The average price of metallurgical coal at coke plants rose 2.0% to $66.36 per short ton. Domestic coal consumption fell 23.1 million short tons during the second quarter of 1982. It was the largest quarterly decline in recent years. (DMC)

19652 **(DOE/EIA—0125(81/4Q)) Coal distribution, January-December 1981.** McNair, M.B. (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Apr 1982. 164p. NTIS, PC A08/MF A01. Order Number DE83008067.

This report presents quarterly US coal distribution data for January-December 1981, aggregated at the US coal producing area, coal producing district, census region, and state levels covering the following subjects: production and purchases; distribution (domestic and foreign); methods of transportation; consumer sector destination; and coal stocks. Coal distribution data are presented for the January-December periods of 1978, 1979, 1980, and 1981 so that comparisons may be made. Data for 1980 and 1981 include both anthracite and bituminous coal distribution while data for 1978 and 1979 cover only bituminous coal distribution. Production and/or purchases of coal produced in the United States from January-December 1981 totaled 819.3 million tons. A total of 820.8 million tons, including 1.4 million tons taken from coal stocks, was shipped to consumers. The January-December 1981 coal production was curtailed by the United Mine Workers of America strike that began on March 27 and ended on June 7. A summary of the coal shipments to consumers in the United States showed that 580.3 million tons went to electric utility plants, 58.1 million tons went to coke plants, 62.8 million tons went to other industrial consumers, a total of 6.9 million tons was distributed for residential/commercial consumers, and 0.1 million tons went to the transportation sector (railroad fuel and vessel fuel). Of the total coal distributed from January-December 1981, 709.5 million tons went to consumers in the United States (including the District of Columbia) and a total of 11.3 million tons was exported - 15.2 million tons to Canada and 96.1 million tons to Mexico and destinations overseas. A summary of mode of transport revealed that 420.9 million tons were shipped by rail, 121.1 million tons were shipped by water, 103.7 million tons by truck, and 62.0 million tons by tramway/conveyor and slurry pipeline. (DMC)

19653 **(DOE/EIA—0125(82/1Q)) Coal distribution, January-March 1982.** McNair, M.B. (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Jul 1982. 92p. NTIS, PC A05/MF A01. Order Number DE82012718.

This report presents quarterly US coal distribution data for January-March 1982, aggregated at the US coal producing area, coal producing district, census region, and state leels covering the following subjects: production and puchases; distribution (domestic and foreign); methods of transportation; consumer sector destination; and coal stocks. Coal distribution data for the January-March periods of 1978 to 1982 are presented so that comparisons may be made. Data for 1980 to 1982 include both anthracite and bituminous coal distribution while data for 1978 and 1979 cover only bituminous coal distribution. Production and/or purchases of coal produced in the United States from January-March 1982 totaled 218.7 million tons. Of this amount, 210.8 million tons were shiped to consumers and 8.0 million tons were added to coal stocks. Of the total coal distributed from January-March 1982, 180.9 million tons went to consumers in the United States (including the District of Columbia) and a total of 29.9 million tons was shipped for export - 3.5 million tons to Canada and 26.3 million tons to Mexico and destinations overseas. A summary of the coal shipments to consumersin the United States showed that 149.8 million tons went to electric utility plants, 12.6 million tons went to coke plants, 16.0 million tons went to other industrial consumers, a total of 2.1 million tons was distributed for residential/commercial consumers, and 0.002 million tons went to the transportation sector (railroad fuel and vessel fuel). The consumer category for 0.4 million tons was either unknown or concealed to avoid the disclosure of individual company data. A summary of the mode of transport showed that 107.2 million tons were shipped by rail, 28.9 million tons by water, 27.1 million tons by truck, and 17.1 million tons by tramway/conveyor or slurry pipeline. (DMC)

19654 **(DOE/EIA—0125(82/2Q)) Coal distribution, January-June 1982.** McNair, M.B. (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Oct 1982. 93p. NTIS, PC A05/MF A01. Order Number DE83008003.

This publication provides data on coal distribution by coal-producing district, consumer use, and method of transport. Production and/or purchases of coal in the United States from January-June 1982 totaled 433.8 million short tons or 24% more than the 349.2 million tons produced or purchased during the same period of 1981. The January-June 1981 coal production was curtailed by the United Mine Workers of America strike that began on March 27 and ended on June 7. Distribution of coal during the first six months of 1982 totaled 421.7 million tons, an increase of 20% over the 352.5 million tons distributed during January-June 1981. A total of 12.0 million tons of coal was added to stocks held by producers and distributors during January-June 1982. In summary, there were no increases during January-June 1982 over the same period in 1980 when the amount of coal to domestic consumers was compared to the percent of all shipments. In contrast, there was a noticeable change when the coal shipments to foreign countries were compared to the percent of all shipments. The amount of coal exported during January-June 1982 was 14% of all shipments compared with 10% of all shipments in January-June 1980. (DMC)

19655 **(DOE/NBB—0026) Documentation of the reserve-related data inputs to the Resource Allocation and Mine Costing model.** (Synergic Resources Corp., Bala-Cynwyd, PA (USA); Oak Ridge National Lab., TN (USA)). Sep 1982. 54p. NTIS, PC A04/MF A01. Order Number DE83008072.

The methodology and data used to prepare reserve-related inputs to the Resource Allocation and Mine Costing (RAMC) program are documented. The report is intended for analysts familiar with the modeling of the coal market and, in particular, the economic-engineering approach to the development of coal supply curves. The reserve-related inputs developed during this study include: distribution of demonstrated reserves by supply region, coal type, and mining method; distribution of reserves dedicated to existing mines (committed reserves) by supply region, coal type, and mining method; allocation of remaining strippable reserves to overburden categories; allocation of remaining deep reserves to seam depth and type opening (drift and shaft/slope) categories; estimation of future recovery factors by supply region and mining method; and estimation of current f.o.b. mine prices by supply region and coal type. Emphasis was placed on using current EIA data files to calculate coal reserve quantities and qualities, coal prices, committed reserves, seam thickness, and production. Data on overburden depth for both strippable and deep reserves were obtained from the Mine Safety and Health Administration (MSHA) and various State agencies. Similar data are not currently collected or maintained by EIA.

19656 **(NP—3900498) Virginia metallurgical-coal production and exports: a prospects update.** Hibbard, W.R. Jr. (Virginia Polytechnic Inst. and State Univ., Blacksburg (USA)). 1 Nov 1982. 16p. NTIS, PC A02/MF A01. Order Number DE83900498.

The metallurgical coal (met coal) market is the most important single factor related to the economic well-being of Virginia's coal industry and its state-based railroads. And, for both industries, it has proved to be an unstable market influenced by the recessionary cycles which have effected US and foreign businesses. Currently, coal producers in southwestern Virginia acknowledge the market is depressed, causing worker layoffs and mine closings, yet the railroads have continued to carry record-breaking quantities of coal to Hampton Roads for export during the first six months of this year, and 1982 totals will be the largest in history. How can this incongruity be explained. This study attempts to identify and evaluate the various factors affecting the met coal market and provides an estimate delineating the Virginia market to the year 2000. It is projected to increase by up to 20 percent as low sulfur, low ash met coal is used as a replacement by electric utilities both here and abroad. This expansion could be further influenced by control regulations, resulting from the current reappraisal of the Clean Air Act, and a narrowed price differential between met and steam coal as an advanced steel-making technology reduces the requirement for coke.

19657 (PB—82-208562) Northern Great Plains coal mining: regional impacts. Agriculture information bulletin. Stinson, T.F.; Bender, L.D.; Voelker, S.W. (Economic Research Service, Washington, DC (USA). Economic Development Div.). Jun 1982. 41p. NTIS, PC A03/MF A01.

Rural communities in the Northern Great Plains (Montana, North Dakota, and Wyoming) must plan for the impacts of large-scale development of the coal deposits in the area. In the long run, communities gaining population because of the new developments, but unable to tax the new mine or powerplant, will probably experience financial problems. In the short run, most affected communities will probably experience front-end cash flow problems due to lags in collecting revenues from the new projects. The combined effects of several new mines and powerplants in a limited geographic area may exceed the capacity of the community to provide services at existing levels.

0160 Health And Safety

REFER ALSO TO CITATION(S) 19427, 19612, 22008, 22018

19658 (LBL—13600, pp 173-176) **Mine ventilation planning: a case study.** McPherson, M.J.; Hood, M. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1981.

One of the main objectives of this work program was to investigate the benefits of employing a systems approach to ventilation design in an existing US mine. Sunnyside Mine No. 3 in Utah has been operating continuously for more than 80 yr. It was selected for the study because its ventilation system was incapable of supplying adequate quantities of air to the working faces.

19659 (NP—3901496) Haulage accident prevention. (Bureau of Mines, Washington, DC (USA). Div. of Education and Training Services). Aug 1972. 230p. Bureau of Mines, Washington, DC.

A textbook for a course in mine haulage safety is presented. The purpose of the course is to instruct the trainee in: (1) awareness of the need for safety in the area of mine haulage; (2) attitudes needed for safety in everyday work situations; and (3) knowledge to improve overall safety in mine haulage. The courses for accidents are discussed and case histories are studied. A discussion on recognizing hazards and recommended safety practices to prevent accidents are presented. The course should take 12 hours to complete. (DMC)

19660 (PB—82-214784) Coal mine dust personal sampler (CMDPS). Final report. Kinneman, W.H. (Bendix Corp., Baltimore, MD (USA). Environmental and Process Instruments Div.). Jul 1973. 15p. NTIS, PC A02/MF A01.

The pump unit and electronic assembly are described for a personal sampler for coal mine dust. Operating characteristics are given, including flow rate, timer accuracy, flow rate stability, pulsation dampening, pressure drop, system leakage test, and intrinsic safety approval. Improvements are suggested for the Coal Mine Dust Personal Sampler design.

19661 (PB—82-214792) Mining hazard evaluation and technical assistance report no. HHF-80-109-110, Patriot Coal Company Laboratory, Kingwood, West Virginia. (National Inst. for Occupational Safety and Health, Cincinnati, OH (USA)). Jun 1980. 16p. (HHE—80-109-110). NTIS, PC A02/MF A01.

On March 5, 1980, at the request of the Mine Safety and Health Administration (MSHA) District 3 Manager, the National Institute for Occupational Safety and Health (NIOSH) conducted an industrial hygiene survey of the Patriot Coal Co.'s Coal Laboratory located in Kingwood, WV., to assess worker exposure to ambient air-borne concentrations of perchloroethylene (PCE)* vapors generated during routine float sink testing of coal. Results of air sampling conducted during the float-and-sink testing operation demonstrated that the personnel employed in this area were exposed to PCE in excess of the current NIOSH recommended ceiling level of 100 parts per million (ppM). The combination of incorrect work practices, inadequate ventilation and the projected workload increase at the laboratory could reasonably be expected to produce exposures in excess of the current MSHA standard (100 ppM-8 hr. Time Weighted Average).

19662 (PB—82-218660) Benefit-cost analysis of health and safety research and development projects in coal, metal and non-metal mining. Open file report Oct 79-Jun 81. Davis, R.P.; Brown, G.R.; Douglas, W.J. (Ketron, Inc., Wayne, PA (USA)). May 1981. 109p. NTIS, PC A06/MF A01.

This report describes the development of an analytical procedure for evaluating the potential economic effects on the mining industry of Bureau of Mines sponsored health and safety projects. A number of economic measures were utilized, most of which involve discounted cash flow analysis. Problems were encountered in attempting to collect data that was both consistent and accurate in validating the modeling procedure. As a consequence, the benefit-cost procedure applies parametric analysis in evaluating projects. By varying parameters that have a high degree of uncertainty over a range of expected values, a corresponding set of benefit-cost indices can be obtained. The Benefit-Cost Index represents the economic output per unit of investment in the proposed technology by the mining industry sector. The Benefit-Cost Analysis Model, version 1 (BCAM/1) is a computerized procedure that has been installed at the Bureau's Pittsburgh Research Center computer facility.

19663 (PB—82-230178) Evaluation of coal mine dust personal sampler performance. Final report. Doemeny, L.J.; Sorenson, S. (Minnesota Univ., Minneapolis (USA). School of Public Health). Nov 1973. 96p. NTIS, PC A05/MF A01.

The performance and accuracy of the coal mine dust personal sampler was evaluated. Mechanical properties of the sampler, such as battery life and pump flow meter accuracy, were kept constant. Penetration curves were obtained using monodisperse aerosols of several diameters for three sampling flow rates and three pulsation rates at each flow rate. The effects of particle charge, sampler orientation, air velocity, and mass loading were evaluated using polydisperse coal dust. Results were compared to the respirable mass dust criterion of the Los Alamos (LASL) Atomic Energy Commission, the British Medical council respirable (BMRC) coal dust criterion, and the American Conference of Governmental Industrial Hygienists (ACGIH) criterion.

19664 (PB—83-131037) Supplied-air respirator system for underground coal miners (instruction manual). (Synsis, Inc., Los Angeles, CA (USA)). 1982. 12p. NTIS, PC A02/MF A01.

A Supplied Air Respirator designed for use by underground mining equipment operators is described. Its assembly, installation, operation, and maintenance are discussed. It is mounted directly on, and derived its power from, the mining machine. A hydraulic motor is required. Compressed air was supplied at 60 to 80 pounds per square inch through a 0.5 inch diameter tube to a mask. Dust is removed down to the submicron range. The authors conclude that this system provides purified air to the coal miner with the least possible interruption of comfort and efficiency.

19665 (PB—83-137265) Measurement and control of respirable dust in mines. Final report. (National Materials Advisory Board (NRC), Washington, DC (USA)). 1980. 417p. NTIS, PC A18/MF A01.

This report examines the problems and hazards of airborne mine dust, particularly in coal-mining operations. A comprehensive overview of the current status of research, legislative regulations, and measurement and control technologies is also provided. Contents include: Chapter I. Executive Summary and Recommendations; Chapter II. Discussion and Conclusions with sections on Definition of Respirable Dust, Effects of Composition, Variations between Individuals, Personal Sampler Units, Other Sampler Units, Dust Production, Suppression and Collection and Noncoal Mines; Chapter III. Overview and Chapter IV. State of the Art in Control of Respirable Dust with sections on Ventilation, Fragmentation, Machine Design, Noncoal Mining, Dust Measurement and Deposition and Retention of Inhaled Particles.

19666 (PB—83-139295) **Industrial hygiene study of TVA workers in coal-fired power plants.** McFeters, J.J. (National Inst. for Occupational Safety and Health, Morgantown, WV (USA)). Jun 1981. 128p. NTIS, PC A07/MF A01.

A survey to measure baseline exposure to coal dust, asbestos (1332214), sulfur-dioxide (7446095) (SO_2), nitrogen-dioxide (10102440) (NO_2) fly-ash (68131748), nitric-oxide (10102439) (NO) sulfites (SO_3) sulfates (SO_4) and noise was conducted at the Tennessee Valley Authority (TVA) coal fired power facilities. Personal and area atmospheric samples were taken and historical exposure data examined.

19667 (PNL-SA—10869) **Identification and comparative genotoxicity of polycyclic aromatic hydrocarbons and related nitrogen-containing heteroatomic species in products from coal liquefaction processes.** Later, D.W.; Pelroy, R.A.; Mahlum, D.D.; Wright, C.W.; Lee, M.L.; Wilson, B.W. (Pacific Northwest Lab., Richland, WA (USA)). Feb 1983. Contract AC06-76RL01830. 18p. (CONF-8210100—2). NTIS, PC A02/MF A01. Order Number DE83006939.

From 7. international symposium on polynuclear aromatic hydrocarbons; Columbus, OH, USA (26 Oct 1982).

A series of process distillation cuts from a solvent refined coal process were separated into polycyclic aromatic hydrocarbons (PAH) and nitrogen-containing polycyclic aromatic hydrocarbons (N-PAC) chemical classes and the fractions tested for biological activity by both microbial mutagenicity and mammalian skin carcinogenicity assays. Qualitative and quantitative chemical characterization of individual PAH and N-PAC in these materials was also performed. The results of biological and chemical analyses are presented in this paper and used to assess the comparative mutagenicity of the PAH and N-PAC from complex mixtures of coal liquefaction materials. Chemical class separation was obtained using adsorption column chromatography. Gas chromatography and mass spectroscopy were used to identify the fractions. The following PAH compounds were identified and quantitiated: phenanthrene, fluoranthene, pyrene, benzoanthracene, chrysene, methylchrysens, benzo(j) or (b)fluoranthene, benzo (k) fluoranthene, 7,12-Dimethyl-benzanthracene, benzopyrene, and benzoperylene. N-PAC compounds identified were: carbazole, benzo(a)carbazole, phenanthridine, 1-azapyrene, 2-azafluoranthene, benz(c)acridine, 2-aminofluorene, 3-aminophenanthrene, 2-aminoanthracene, 2-aminopyrene, 8-aminofluoranthene, 3-aminochrysene, and 7-aminobenzo(a)pyrene. In terms of microbial mutagenicity using the Ames test, the N-PAC, in general, are more active than the PAH; the principal mutagenic N-PAC agents being the amino-PAH. If carcinogenicity is investigated by the mouse skin initiation/promotion approach, the PAH are the most potent carcinogens with activity increasing with increasing distillation temperature. (DMC)

0170 Legislation And Regulations

REFER ALSO TO CITATION(S) 19591, 20812

19668 (CONF-800878—, pp 1-11) **United States Synthetic Fuels Corporation: a banker's perspective.** Mueller, C.M. (Bankers Trust Co., New York, NY). 1980. Univ. of Pittsburgh, Dept. of Chemical and Petroleum Engineering, Pittsburgh, PA 15261.

From 7. annual international conference on coal gasification, liquefaction, and conversion to electricity; Pittsburgh, PA, USA (5 Aug 1980).

To put it simply: The Synthetic Fuels Corporation is intended to shorten the lead time for the development of a viable synfuels industry. In setting up the corporation the government has recognized the need to offer initial aid by assuming unquantifiable risks. Under this umbrella, the private sector can then evaluate and eventually accept these risks, and with them the full ownership and control of the industry. This government action will result in the promotion and development of a new industry on an accelerated basis, at a time when its development is most critical. The Synfuels Corporation is nearly unique in the history of the US government support of industrial development. The Synfuels Corporation is equipped to face challenges that could not be coped with through the capabilities granted to any other agency. The critical issue is how successfully it meets those challenges. To a very large extent this will depend upon the corporation's inherent structural strengths and weaknesses and the skill with which the program is administered. It will also depend on its ability to attract investors and their financiers.

19669 (CONF-800878—, pp 12-38) **Synthetic fuels: a view of the Energy Security Act from the inside.** Grundy, R.D. (Senate Committee on Energy and Natural Resources, Washington, DC). 1980. Univ. of Pittsburgh, Dept. of Chemical and Petroleum Engineering, Pittsburgh, PA 15261.

From 7. annual international conference on coal gasification, liquefaction, and conversion to electricity; Pittsburgh, PA, USA (5 Aug 1980).

The purpose of Title I of the Energy Security Act is to utilize to the fullest extent the Constitutional powers of the Congress to reduce the threat of economic disruption from oil supply interruptions and increase the nation's security by fostering commercial synthetic fuel production the equivalent of at least 500,000 barrels of crude oil equivalent per day by 1987, increasing to 2 million barrels per day by 1992. Perhaps the most significant feature of the Energy Security Act is the Congress' judgment that such a major federal commitment to the development of a domestic synthetic fuels industry required creation of a special purpose federal entity - the United States Synthetic Fuels Corporation. An independent federal entity was authorized to provide financial assistance to encourage and assure the flow of capital funds to those sectors important to the domestic production of synthetic fuel. This action is comparable to establishment of the National Aeronautics and Space Administration (NASA) to carry out our national commitment to place a man on the moon. Before awarding financial assistance the Corporation must undertake a solicitation on a competitive basis. An initial set of solicitations must encompass a diversity of synthetic fuel technologies as well as all the available forms of financial assistance. The Congress intended that all solicitations be formulated to encourage innovative synthetic fuel proposals encompassing the broadest range of concepts. Thus the Congress intended that solicitations not unnecessarily contain sufficient detail so as to constrain bidders.

19670 (CONF-800878—, pp 287-303) **Guidelines for coping with the Powerplant and Industrial Fuel Use Act of 1978.** Vlcek, J.B. (Gardner, Carton and Douglas, Washington, DC). 1980. Univ. of Pittsburgh, Dept. of Chemical and Petroleum Engineering, Pittsburgh, PA 15261.

From 7. annual international conference on coal gasification, liquefaction, and conversion to electricity; Pittsburgh, PA, USA (5 Aug 1980).

Coverage: (a) The Powerplant and Industrial Fuel Use Act (FUA) applies to new and existing powerplants and new and existing Major Fuel-Burning Installations (MFBI's). (b) Powerplants and MFBI's are defined as boilers, internal combustion engines (MFBI's only), gas turbines, or combined cycle units. Use of petroleum or natural gas in new powerplants or new MFBI's is prohibited unless an exemption is granted. Use of natural gas is prohibited in existing powerplants after January 1, 1990 unless an exemption is granted. The Secretary of the Department of Energy (the Secretary) may, at any time, prohibit use of natural gas or petroleum in existing powerplants on a case-by-case or categorical basis unless such plant qualifies for an exemption. The Secretary may, at any time, prohibit use of petroleum or natural gas in an existing MFBI that is capable of using coal or an alternate fuel, unless such installation qualifies for an exemption. Final regulations issued in June 6, 1980 Federal Register generally cover all Parts except those pertaining to existing MFBI's and powerplants. Cites for those Parts are to interim regulations contained in July 23, 1979 Federal Register. In some cases, under certain conditions, temporary or permanent exemptions can be obtained. The conditions and methods of filing for such are discussed in the paper. They are very complex and need to be read in detail.

19671 (DOE/METC—82-51, pp 195-200) **Comments on the gasification of coal.** Reichl, E.H. Sep 1982. NTIS, PC A10/MF A01.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

The review talk was generally critical of the results of US research in coal gasification. In spite of the large expenditures in the US, the innovations reported as most significant with respect to commercialization were the Koppers-Totzek process, the Lurgi pressurized and slagging reactor development (both by Lurgi and BGG at West field) and the high pressure, fluidized bed pilot plant by Winkler (i.e. the significant developments occurred in Europe). This is contrasted with the American success in putting a man on the moon and developing the atom bomb: synthetic fuels are a different problem. There has been one result from the billions of dollars that was indeed a great contribution and one that would not have happened without DOE dollars: the education of an entire generation of scientists and engineers in the field of coal. Many professionals are now knowledgeable about gasification. Maybe several thousands of them would not have been involved in coal in any way short of this Government-sponsored program. This is a major asset for the nation, particularly for a nation with such huge resource of coal within its borders. Without this Government program, these people would not exist. Maybe the payoff will come about as a result of this educational process. Maybe curiosity has been sufficiently aroused and inventiveness stimulated so that just one of them will lead us to the promised land of an economic synthetic fuel process.

02 PETROLEUM

REFER ALSO TO CITATION(S) 19399

19672 **(DOE/EIA—0219(81)) International energy annual, 1981.** (USDOE Energy Information Administration, Washington, DC. Office of Energy Markets and End Use). Sep 1982. 106p. NTIS, PC A06/MF A01. Order Number DE83008066.

An overview of world primary energy is presented in Btus; in quantity production; and in petroleum supply, disposition and refinery capacity; natural gas supply and disposition; coal supply and disposition; world petroleum prices and energy reserves. Appendices cover energy sources; geographical regions; volume and weight conversions by energy source; and gross thermal conversions by energy source. (PSB)

0201 Reserves

19673 **(PB—82-230954) Estimation of resources and reserves. Final report.** Adelman, M.A.; Houghton, J.C.; Kaufman, G.; Zimmerman, M. (Massachusetts Inst. of Tech., Cambridge (USA). Energy Lab.). Mar 1982. 533p. NTIS, PC A23/MF A01.

This report analyzes the economics of resource and reserve estimation. Part One deals with the economic theory of natural resources and examines how markets deal with exhaustible resources. The succeeding parts examine each resource individually. Part Two and Three deal with oil and gas. Part Two treats the measurement of already discovered deposits. It examines the concept of proven reserves and the behavior of resources over time. Part Three turns to undiscovered deposits and asks how the size of undiscovered but suspected deposits are estimated. It casts a critical eye upon the biases inherent in many of the estimation methodologies. Part Four examines coal resource and reserve estimation. In the United States an attempt has been made to define an economically meaningful classification of coal reserves and resources. This classification is analyzed in detail along with the more general issue of coal supply. The focus is on already discovered deposits since knowledge of where coal lies is great and new discoveries play a small role in coal supply. Part Five treats uranium. For uranium, as for coal, extraction costs are high and reserve estimation must reckon with cost estimation. Part Six synthesizes Parts Two through Five by placing resource and reserve estimates in the context of a cumulative cost curve.

0202 Geology And Exploration

REFER ALSO TO CITATION(S) 19683, 22029

19674 **(DOE/EIA—0372/1) Outer Continental Shelf (OCS) Oil and Gas Supply Model. Model 1. Model summary and methodology description.** Farmer, R.D. (USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas). Dec 1982. 87p. NTIS, PC A05/MF A01. Order Number DE83008788.

This document describes the methods utilized in the Energy Information Administration's Outer Continental Shelf Oil and Gas Supply Model (OCSM) to evaluate the impacts of alternative economic and policy situations on future oil and gas production from the Outer Continental Shelf (OCS) regions of the Lower-48 states. The volume is organized into three chapters. In the introductory chapter, the basic analytical capabilities of the model are listed, and both the economic rationale for the model design and the basic structure of the model are described. Also, OCSM is compared to several previous models developed to evaluate OCS petroleum resources. Chapter 2 describes in more detail how the model represents the economics of the oil and gas supply process. The principal stages of activity conducted by offshore petroleum firms, the economic choices faced by firms at each of these stages, and the model's representation of this decisionmaking are described. Chapter 2 concludes with a summary of the major strengths and limitations of the OCSM approach to forecasting OCS petroleum supply. Chapter 3 describes the structure of the model, the major functions performed in each of the model's components, and the general mathematical representation of these functions.

19675 **(DOE/EIA—0372/2) Outer Continental Shelf (OCS) Oil and Gas Supply Model. Volume 2. Data description.** Farmer, R.D.; Zaffarano, R.F. (USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas). Dec 1982. 79p. NTIS, PC A05/MF A01. Order Number DE83008787.

This document describes the sources of data used by the Outer Continental Shelf Oil and Gas Supply Model (OCSM). The prime objective of this report is to document the sources of data on which the model is based. Thus, the report permits supply forecasts and the results of analyses that rely on the model to be properly evaluated and verified, and it also facilitates updating and revision of the basic data sources. In addition to providing basic documentation of OCSM, however, the report also provides resource, technology, and cost data that are of value in their own right for analysis of many issues concerning the exploitation of offshore petroleum resources. These data have numerous applications that do not depend on use of the total modeling system.

19676 **(NP—3900704) Prospects for oil and gas in the Coos Basin, western Coos, Douglas, and Lane Counties, Oregon. Oil and gas investigation 6.** Newton, V.C. Jr. (Oregon State Dept. of Geology and Mineral Industries, Portland (USA)). 1980. 114p. State of Oregon, Dept. of Geology & Mineral Industries, 1005 State Office Bldg., Portland, OR 97201.

The Coos Basin investigation was undertaken to evaluate the possibility of finding commercial amounts of oil and gas in the region. The study was extended to include the continental shelf because that area is believed to contain the best prospects in the State for hydrocarbon accumulations. Although mapping of geologic structures was the main thrust of field work, some basic mapping of sedimentary units was done in the northern part of the project area. Sandstones appearing to have reservoir qualities were sampled for porosity and permeability tests. Petrography of these sandstones was done to see if rock units could be identified by mineral characteristics. Samples of well cuttings and shale outcrops were tested for source rock characteristics to learn if maturation of organic material contained in geologic formations of the Coos Basin had reached a point where oil and gas could have been generated. Samples were taken from five deep wells for micropaleontological determinations to determine the stratigraphy and structure of the Coos Basin and the adjacent continental shelf. Seismic records of the southwestern coastal area were processed for the first time by

Couch's Geophysical Group to give a model of subsurface conditions offshore. These data were tied to gravity, magnetic, and deep well correlations both offshore and onshore.

19677 **(PB—82-227653) Studies related to the deep earth gas. Annual report Jan-Dec 81.** Gold, T.; Bilson, E.; Soter, S. (Cornell Univ., Ithaca, NY (USA). Center for Radiophysics and Space Research). Mar 1982. 65p. NTIS, PC A04/MF A01.

The purpose of this research is to elucidate the origin of terrestrial hydrocarbons, principally of methane and petroleum. This year the authors continued the experimental and theoretical work conceived for this purpose. They obtained the first significant experimental success in reacting methane with petroleum hydrocarbons. They established that such a reaction does occur at a measurable rate in the presence of natural clay catalysts at temperatures and pressures existing in the geological setting of petroleum formation. Thus they have shown that upward migrating methane may participate in petroleum formation. The authors have assembled a great deal of evidence concerning regional patterns of hydrocarbon deposits, trace element content, the geologic setting of the deposits and the chemical and physical processes in the upper mantle and the crust, toward the case that methane from deep sources has penetrated the crust in large quantities, and that this has contributed to the formation of much of the world's natural fuel supplies.

19678 **(PB—82-236266) Estimation of the future rates of oil and gas discoveries in the western Gulf of Mexico. Professional paper.** Drew, L.J.; Schuenemeyer, J.H.; Bawiec, W.J. (Geological Survey, Reston, VA (USA)). 1981. 32p. NTIS, PC A03/MF A01.

The purpose of this study was to devise a model to forecast the rate at which oil and gas fields will be discovered in the study area in the Gulf of Mexico. The study area is off Texas and Louisiana and covers 156,639 sq km in which water depths are as great as 200 m. Making a forecast for this region is more complicated than making a similar forecast for a typical onshore basin. These complications arise because exploration for oil and gas in the Gulf of Mexico has been both geographically and temporally restrained by economic, technical, legal, and philosophy-of-exploration factors.

19679 **(USGS/CHART/OC—106) Summary chart of geological data from the COST No. B-3 well, US Mid-Atlantic Continental Slope.** Schoole, P.A.; Schwab, K.A.; Krivoy, H.L. (Geological Survey, Arlington, VA (USA)). 1981. 18p. Geological Survey, 1200 South Eads Street, Arlington, VA 22202.

0203 Drilling And Production

REFER ALSO TO CITATION(S) 19674, 22031

19680 **(DOE/EV/04763—T1) Improved weather services for helicopter operations in the Gulf of Mexico. Final report.** Hilsenrod, A. (Federal Aviation Administration, Washington, DC (USA). Systems Research and Development Service). Jun 1981. Contract AC05-76EV04763. 84p. NTIS, PC A05/MF A01. Order Number DE83007915.

Current weather services in support of the more than 800 helicopters operating in the Gulf of Mexico is reviewed and the limitations noted. Means of improving these services based on currently available facilities and ongoing research and development efforts are presented. Immediate improvements in weather services can be attained by the implementation of a plan agreed upon by personnel of the FAA, NWS, and helicopter operators. Near-term (to 1986) and longer-term (beyond 1986) developments in observations, forecasts, and communications that can improve weather services are presented.

19681 **(DOE/NBM—3007519) Enhanced oil recovery by CO_2 foam flooding.** Patton, J.T. (New Mexico State Univ., Las Cruces (USA). Dept. of Chemical Engineering). Jul 1982. 154p. NTIS, PC A08/MF A01. Order Number DE83007519.

Experiments on gas mobility control, conducted in linear sand-pack models, show only a general correlation with the static foam test. In general, all surfactants which produce reasonable quantities of foam in the blender test also impart some degree of mobility control to gas during two-phase flow. The best mobility control additives, however, are only modest foam volume producers. Three basic chemical structures are promising for gas mobility control: Ethoxylated adducts of C_6 - C_{14} linear alcohols, sulfate ethers of ethoxylated C_9 - C_{16} linear alcohols, and low-molecular weight copolymers of ethylene oxide and propylene oxide. Some of the research effort centered on the rheology of foams. The efficacy of CO_2 mobility control in enhancing oil recovery was demonstrated experimentally. Flow tests were conducted with a viscous oil under immiscible displacement conditions. Mobility control increased recovery by 40% over a CO_2 enhanced waterflood and 93% over a conventional waterflood plus primary production. No adverse effects due to mobility control additives were noted. Mass transfer of CO_2 from the foam to the oil was not impleded. The experiment was performed without severe gas and liquid slugging.

19682 **(LBL—13600, pp 166-167) Enhanced recovery of heavy oils with alkali.** Radke, C.J.; Somerton, W.H. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1981.

Many oils, especially those classed as heavy oils, contain natural acids, such as alkyl and aryl carboxylics and porphyrins. In contact with aqueous alkalis, these acidic components can produce surface-active molecules that aid in oil displacement. The objective of this project is to study the fundamental mechanisms of alkali-enhanced oil recovery to permit better process design.

19683 **(USGS-OFR—82-242) Gulf of Mexico summary report 3. A revision of Outer Continental Shelf oil and gas activities in the Gulf of Mexico and their onshore impacts: Gulf of Mexico summary report 2, August 1981.** Havran, K.J.; Wiese, J.D.; Collins, K.M.; Kurz, F.N. (Rogers, Golden and Halpern, Inc., Reston, VA (USA)). Aug 1982. 137p. Office of OCS Information, Minerals Management Service, 12203 Sunrise Valley Drive, Reston, VA 22091.

This report is the latest in a series of annual reports summarizing current oil and gas activities in the Gulf of Mexico OCS and their onshore impacts. Oil production for 1981 was 0.27 billion barrels, and gas production was 4.84 trillion cubic feet. Most of the shallow-water areas of the Gulf of Mexico Continental Shelf have been explored. Industry has been developing the technology to explore deepwater areas, and interest in these portions of the Gulf is increasing. As of December 1981, the total of all identified oil and gas fields in the Gulf of Mexico OCS increased to 505 from 482 at the end of the previous year. The number of active fields increased from 466 in 1981, and fields for which reserve estimates have been made increased from 419 to 445. As of January 1982, 19,736 offshore oil and gas wells had been drilled in the Gulf of Mexico OCS; most of the wells (17,257) are off the coast of Louisiana. Currently, there are 2027 active oil and gas leases in the Gulf of Mexico; 1200 of them are producing leases. The Department of the Interior's 5-year OCS oil and gas leasing schedule projects 2 to 3 Gulf of Mexico lease sales per year through 1987, for a total of 12 offerings. Since 1972, oil production in the Gulf of Mexico has declined each year, and gas production, thought to have reached its peak in 1981, is also expected to begin a noticeable decline. To date, most of the oil and gas discovered in the Gulf has occurred on the Texas-Louisiana Shelf, but in the future, oil and gas exploration is likely to include a number of areas where previous leasing has not been extensive. Each year, hundreds of miles of pipelines are added to the existing network in the Gulf of Mexico. Recently, there have been a number of proposals for deepwater ports and transshipment terminals as well as projects including the deepening or widening of existing conventional ports. (DMC)

19684 **Fluidized bed combustion for oil field steam generation and process heating applications.** Davis, J.S.; Young, W.W.; Lyons, C.J. (Struthers Wells Corp). *Coal Technology;* 29-51(1981). (CONF-8111140—).

From 4. international coal utilization conference; Houston, TX, USA (17 Nov 1981).

A new approach for large oil field steam generators is examined. It utilizes lower value solid fuels such as coal, lignite, and petroleum coke. The use of solid fuels will result in approximately a

50% increase in net oil production without additional heat input by eliminating the liquid fuel requirements for current oil fired steam generators. The new approach has incorporated the technological advantages of Battelle's Multi-Solid Fluidized Bed Combustion (MS-FBC) and Struthers Thermo-Flood steam generators. The MS-FBC differs from conventional fluidized bed designs in its unique uncoupled arrangement of separated combustor and heat transfer sections. The solid-fueled design presented exhibits significant future applicability for cogeneration or combined cycles, and a range of critical process heating systems. This paper examines the application of this novel technology for solid-fuel Fired Dowtherm vaporizers and indirect heated, gas turbine power cycles. 6 refs.

0204 Processing

REFER ALSO TO CITATION(S) 19539, 21257

19685 **(DOE/ER/10645—7) Multivariable process control: a survey.** Ray, W.H. (Wisconsin Univ., Madison (USA). Dept. of Chemical Engineering). 1982. Contract AC02-80ER10645. 28p. (CONF-8208113—1). NTIS (US Sales Only). Order Number DE83007322.

From International symposium on process systems engineering; Kyoto, Japan (1 Aug 1982).

A survey is provided of the state of the art in multivariable process control. Recent literature is organized and tabulated by topic to provide material for further study. The survey encompasses both linear and nonlinear multivariable systems, on-line estimation, adaptive control, distributed systems, and recent developments in computer-aided control system design. These developments together with recent applications provide the basis for predictions of the future evolution of the field. 396 references, 10 figures, 11 tables.

19686 **New concepts reduce process energy.** Humphrey, J.L. (Argonne Natl Lab, IL, USA). *Hydrocarbon Processing;* **61**: No. 7, 141-144(Jul 1982).

This paper presents results of a study of energy conservation in the following areas of technology: energy-efficient methods of separation; alternative fuels and feedstocks; recovery of low-level heat; and advanced concepts. Although the above technologies were identified and evaluated in terms of their application specifically to chemical plants and petroleum refineries, they have the potential of conserving oil and gas across a broad spectrum of industrial processes. Economic considerations are included in the study. 17 refs.

0205 Products And By-products

19687 **(PB—82-227810) Mini-assessment of environmental trends and problems: alternative feedstocks. Final report.** Burck, G.M.; Rio4dan, B.J.; Hoffman, K.C.; Meehan, R.W. II. (Mathtech, Inc., Arlington, VA (USA)). Jun 1982. 247p. NTIS, PC A11/MF A01.

This report discusses the potential for replacing oil and natural gas, the major organic chemical feedstocks, with alternative source materials and the consequent potential for environmental damage. Major emphasis is on five basic chemicals, and others are also considered. Current sources and uses of key chemicals are traced and a projection is made to the year 2000 under assumptions reflecting current market conditions. Three scenarios then define the upper limits for potential alternative feedstocks: (1) coal-based synthesis gas, (2) synfuel by-products, and (3) biomass.

0206 Health And Safety

REFER ALSO TO CITATION(S) 19738

19688 **(PB—82-233909) Well control in case of offshore blowout: oil collection on platforms. Final report.** Westergaard, R.H. (Sentralinstitutt for Industriell Forskning, Oslo (Norway)). Mar 1981. 13p. NTIS, PC A02/MF A01.

It is concluded that oil coming from a blowout through a diverter in principle can be recovered, but this is complicated and dangerous and not worth consideration because once successfully diverted, the blowout will most likely not last more than hours or a few days. The report concludes that use of special oil catchers and of knockdown nozzles in the rig holds too little promise to be worth working with. Spill collection trays under the drill floor and/or the cellar deck are considered interesting, and further work under the Statoil Project is recommended, particularly for Condeeps.

19689 **(PB—82-238296) Verification of cryogenic blowout control technology for offshore wells. Final report.** Powers, J.V.; Kuchar, W.E.; McClure, B.; Schwinkendorf, W.E.; Gregory, J. (BDM Corp., Albuquerque, NM (USA)). 2 Jun 1982. 55p. NTIS, PC A04/MF A01.

This report describes the BDM laboratory test program which successfully demonstrated the functional principle of a cryogenic blowout control device for offshore oil wells. The device, which would first be placed downhole as part of the casing string while drilling and later be part of the production tubing, is referred to as a Downhole Shut-In Device (DSD). This report is divided into six sections. Section B presents background material on blown-out oil wells and a description of the full scale DSD, section C summarizes the test program giving major results and conclusions, section D presents the detailed technical approach, section E gives test results, and F gives conclusions and recommendations.

19690 **(PB—82-239757) Well control in case of offshore blowout: collecting oil in the water. New concept based on using a separate underwater work base and a collection unit. Final report Oct 80-Mar 81.** Westergaard, Rich.H.; Wetlesen, T. (Sentralinstitutt for Industriell Forskning, Oslo (Norway)). Mar 1981. 26p. NTIS, PC A03/MF A01.

It seems possible to make underwater collection simpler and cheaper by combining a small and simplified collection unit with a proposed underwater work base.

0207 Marketing And Economics

REFER ALSO TO CITATION(S) 19539, 19647, 19648, 19649, 19683, 19730

19691 **(DOE/EIA—0008(82/2Q)) Energy information report to Congress: quarterly report. Second quarter, 1982.** (Department of Energy, Washington, DC (USA). Energy Information Administration). Sep 1982. 45p. NTIS, PC A03/MF A01. Order Number DE83008059.

This report was prepared in response to the mandate of Congress set forth in Public Law 93-319, Section 11 (c)(2), that requires for each calendar quarter a report that contains energy information including imports of crude oil, petroleum products, natural gas, and coal; reserves and production of crude oil, natural gas, and coal; refinery activities; and petroleum inventories.

19692 **(DOE/EIA—0032(82/01)) Monthly petroleum product price report.** Riner, C. (USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas). Jan 1982. 18p. NTIS, PC A02/MF A01. Order Number DE83007897.

This report provides information on monthly national weighted average prices for refined petroleum products. The data published are the primary source of price data for refined products for the refining, reselling, and retailing sectors necessary for the Department of Energy (DOE) to execute its role in monitoring prices. In addition, the data provide the information necessary for Congress, DOE, and the public to perform analyses and projections related to energy supplies, demands, and prices. Price data in this publication were collected from separate surveys. Average prices are derived from a survey of refiners, large resellers and/or retailers, and independent gas plant operators. Data from this monthly survey are available from July 1975. Average No. 2 heating oil prices were derived from a sample survey of refiners, resellers, and retailers who sell heating oil. The geographic coverage for this report is the 50 states and the District of Columbia. Data are presented on the following: gasoline, No. 1 and No. 2 diesel fuels, No.

1 and No. 2 heating oils, residual fuel oil, aviation fuels, kerosene, and liquefied petroleum gases.

19693 **(DOE/EIA—0032(82/02)) Monthly petroleum product price report.** Riner, C. (USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas). Feb 1982. 18p. NTIS, PC A02/MF A01. Order Number DE83008089.

This report provides information on monthly national weighted average prices for refined petroleum products. The data published are the primary source of price data for refined products for the refining, reselling, and retailing sectors necessary for the Department of Energy (DOE) to execute its role in monitoring prices. In addition, the data provide the information necessary for Congress, DOE, and the public to perform analyses and projections related to energy supplies, demands, and prices. Price data in this publication were collected from separate surveys. Average prices are derived from a survey of refiners, large resellers and/or retailers, and independent gas plant operators. Data from this monthly survey are available from July 1975. Average No. 2 heating oil prices were derived from a sample survey of refiners, resellers, and retailers who sell heating oil. The geographic coverage for this report is the 50 states and the District of Columbia. Data are presented on the following: gasoline, No. 1 and No. 2 diesel fuels, No. 1 and No. 2 heating oils, residual fuel oil, aviation fuels, kerosene, and liquefied petroleum gases.

19694 **(DOE/EIA—0032(82/03)) Monthly petroleum product price report.** Riner, C. (USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas). Mar 1982. 18p. NTIS, PC A02/MF A01. Order Number DE83008107.

Data are reported on the prices of petroleum products for the period January 1981 through March 1982. The following products are included in the survey: gasoline, diesel fuels, No. 1 and No. 2 heating oils, No. 5 and No. 6 fuel oils, aviation fuels, residual fuels, kerosene and liquefied petroleum gases. Prices are also indexed according to ultimate consumer. This report provides Congress and the public with information on monthly national weighted average prices for refined petroleum products. The data published are the primary source of price data for refined products for the refining, reselling, and retailing sectors necessary for the Department of Energy (DOE) to execute its role in monitoring prices. In addition, the data provide the information necessary for Congress, DOE, and the public to perform analyses and projections related to energy supplies, demands, and prices. Price data in this pubication were collected from separate surveys. Average prices are derived from a survey of refiners, large resellers and/or retailers, and independent gas plant operators. The geographic coverage for this report is the 50 states and the District of Columbia. (DMC)

19695 **(DOE/EIA—0032(82/05)) Monthly petroleum product price report.** (USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas). May 1982. 18p. NTIS, PC A02/MF A01. Order Number DE83008106.

Data are reported on the prices of petroleum products for the period January 1981 through May 1982. The following products are included in the survey: gasoline, diesel fuels, No. 1 and No. 2 heating oils, No. 5 and No. 6 fuel oils, aviation fuels, residual fuels, kerosene, and liquefied petroleum gases. Prices are also indexed according to ultimate consumer. This report provides Congress and the public with information on monthly national weighted average prices for refined petroleum products. The data published are the primary source of price data for refined products for the refining, reselling, and retailing sectors necessary for the Department of Energy (DOE) to execute its role in monitoring prices. In addition, the data provide the information necessary for Congress, DOE, and the public to perform analyses and projections related to energy supplies, demands, and prices. Price data in this publication were collected from separate surveys. Average prices are derived from a survey of refiners, large resellers and/or retailers, and independent gas plant operators. The geographic coverage for this report is the 50 states and the District of Columbia. (DMC)

19696 **(DOE/EIA—0032(82/06)) Monthly petroleum-product price report.** (USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas). Jun 1982. 18p. NTIS, PC A02/MF A01. Order Number DE83008105.

Data are reported on the prices of petroleum products for the period January 1981 through June 1982. The following products are included in the survey: gasoline, diesel fuels, No. 1 and No. 2 heating oils, No. 5 and No. 6 fuel oils, aviation fuels, kerosene, and liquified petroleum gases. Prices are also indexed according to ultimate consumer. This report provides Congress and the pubilc with information on monthly national weighted average prices for refined petroleum products. The data published are the primary source of price data for refined products for the refining, reselling, and retailing sectors necessary for the Department of Energy (DOE) to execute its role in monitoring prices. In addition, the data provide the information necessary for Congress, DOE, and the public to perform analyses and projections related to energy supplies, demands, and prices. Price data in this publication were collected from separate surveys. Average prices are derived from a survey of refiners, large resellers and/or retailers, and independent gas plant operators. The geographic coverage for this report is the 50 states and the District of Columbia. (DMC)

19697 **(DOE/EIA—0032(82/07)) Monthly petroleum-product price report.** (USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas). Jul 1982. 18p. NTIS, PC A02/MF A01. Order Number DE83008042.

This report provides Congress and the public with information on monthly national weighted average prices for refined petroleum products. the data published are the primary source of price data for refined products for the refining, reselling, and retailing sectors necessary for the Department of Energy (DOE) to execute its role in monitoring prices. In addition, the data provide the information necessary for Congress, DOE, and the public to perform analyses and projections related to energy supplies, demands, and prices. The legislative authority for this survey is the Federal Energy Administration Act of 1974 (PL 93-275). Price data in this publication were collected fronm separate surveys. Average prices are derived from a survey of refiners, large resellers and/or retailers, and independent gas plant operators. Data from this monthly survey are available from July 1975. Average No. 2 heating oil prices were derived from a sample survye of refiners, resellers, and retailers who sell heating oil. The geographic coverage for this report is the 50 states and the District of Columbia.

19698 **(DOE/EIA—0035(82/08)) Monthly energy review.** (Department of Energy, Washington, DC (USA). Energy Information Administration). Aug 1982. 105p. NTIS, PC A06/MF A01. Order Number DE83008092.

Current data and trends for production, consumption, stocks, imports, exports, and prices for the principal energy commodities in the United States are presented. Also included are data on international production of crude oil, consumption of petroleum products, petroleum stocks, and production of electricity from nuclear powered facilities. This report is published to keep the public and other interested parties fully informed with respect to current energy production, consumption, stocks, and prices.

19699 **(DOE/EIA—0035(82/12)) Monthly energy review.** (Department of Energy, Washington, DC (USA). Energy Information Administration). Dec 1982. 105p. NTIS, PC A06/MF A01. Order Number DE83008044.

Current data for production, consumption, stocks, imports, exports, and prices for the principal energy commodities in the United States are presented. Also included are data on international production of crude oil, consumption of petroleum products, petroleum stocks, and production of electricity from nuclear powered facilities.

19700 **(DOE/EIA—0109(82/03)) Petroleum supply monthly.** (USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas). Mar 1982. 108p. NTIS, PC A06/MF A01. Order Number DE83008053.

Data are presented on the supply and distribution of petroleum and petroleum products in the USA during January, 1982. Included are statistics on production, consumption, imports, exports, stocks, and transport. A section discussing US petroleum developments during 1981 is also included. (DMC)

19701 **(DOE/EIA—0109(82/04)) Petroleum supply monthly.** (USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas). Apr 1982. 116p. NTIS, PC A06/MF A01. Order Number DE83008054.

Data are presented on the supply and distribution of petroleum and petroleum products in the USA during February, 1982. Included are statistics on production, consumption, imports, exports, stocks, and transport during the same period. A section discussing the timeliness and accuracy of selected monthly petroleum data is also included. (DMC)

19702 **(DOE/EIA—0109(82/05)) Petroleum supply monthly.** (USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas). May 1982. 109p. NTIS, PC A06/MF A01. Order Number DE83008057.

Data are presented on the supply and distribution of petroleum and petroleum products during March 1982, as well as data on production storage, imports, exports, and consumption. In addition, a section is included on the availability of motor gasoline for summer 1982. (DMC)

19703 **(DOE/EIA—0109(82/06)) Petroleum supply monthly.** (USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas). Jun 1982. 117p. NTIS, PC A06/MF A01. Order Number DE83008056.

Data from a survey of US petroleum refineries are presented. The EIA refinery survey reveals that there has been a decline in the total number of operable refineries, from 324 on January 1, 1981, to 301 on January 1, 1982, while some refinery facilities are being upgraded to meet changing market conditions. Because of the introduction of more sophisticated equipment in a number of refineries, the industry is maintaining its flexibility to produce preferred fuels. Further, the survey also reveals that the US refining industry is equipped to meet expected levels of demand. Refinery Idle Capacity increased from 293,000 b/d to 1786 d/d from 1979 to 1982. The number and capacity of operable petroleum refineries are tabulated by PAD district and state. Crude oil and petroleum products supply and distribution data during April 1982 are included as well as data on crude oil and petroleum products imports from OPEC sources. (DMC)

19704 **(DOE/EIA—0109(82/07)) Petroleum supply monthly.** (USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas). Jul 1982. 109p. NTIS, PC A06/MF A01. Order Number DE83008055.

Data are presented on the supply and disposition of crude oil and petroleum products in the USA during May 1982. In addition summary data are presented describing activities during the first 6 months of 1982. (DMC)

19705 **(DOE/EIA—0109(82/08)) Petroleum supply monthly.** (USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas). Aug 1982. 107p. NTIS, PC A06/MF A01. Order Number DE83008064.

Data are presented on the distribution, production, imports, exports, and consumption of crude oil and petroleum products in the US during April 1982. A discussion of petroleum imports and exports is also included. (DMC)

19706 **(DOE/EIA—0109(82/09)) Petroleum Supply Monthly.** (USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas). Sep 1982. 116p. NTIS, PC A06/MF A01. Order Number DE83008063.

Data are presented on the supply, distribution, production, storage, imports, exports, and consumption of petroleum and petroleum products in the US during July 1982. Crude oil and natural gas liquids plant production averaged 10.2 million barrels per day, up slightly from the 10.0 million barrels per day during the same period in 1981. Petroleum products supplied (a proxy for consumption) averaged 14.8 million barrels per day, down 5.8% from the 15.7 million barrels daily average for July of 1981. Refinery inputs of crude oil averaged 12.4 million barrels per day, a 1.5% increae over the previous July. Daily operable crude oil distillation capacity averaged 17.1 million barrels daily, compared with 18.7 million barrels daily a year earlier. The refinery utilization rate was 75.2% in July 1982, compared with 67.4% one year earlier. Total petroleum net imports averaged 5.0 million barrels per day, and the year-to-date level averaged 4.1 million barrels per day, compared with 5.5 million barrels per day for the first 7 months in 1981. Petroleum product stocks at the end of July 1982 were lower than year earlier levels, 782 million barrels compared with 880 million barrels. July 1982 residual fuel oil stocks were 10 million barrels lower than those a year earlier; and inventories of total motor gasoline at the end of July 1982 were 2 million barrels below the July 1981 level.

19707 **(DOE/EIA—0109(82/10)) Petroleum Supply Monthly.** (USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas). Oct 1982. 104p. NTIS, PC A06/MF A01. Order Number DE83008017.

Data are presented on the supply and disposition of crude oil and petroleum products during August 1982. Data are also included on production, consumption, imports, exports, storage and transport of crude oil and petroleum products. A section is also presented summarizing the 1981 annual report of US crude oil, natural gas, and natural gas liquids reserves. (DMC)

19708 **(DOE/EIA—0109(82/11)) Petroleum supply monthly.** (USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas). Nov 1982. 115p. NTIS, PC A06/MF A01. Order Number DE83008009.

Data are presented on the supply and distribution of crude oil and petroleum products during September 1982, as well as data on production, storage, imports, exports and consumption. Data are tabulated and analyzed according to PAD district. A section on trends in domestic crude oil production and reserves is included. Drilling activity has decreased in 1982 following the crude oil price decline that started in mid-1981. The energy Information Administration (EIA), therefore, expects that crude oil production wil decline during 1983 by about 110 thousand barrels per day from its projected 1982 level to average 8.5 million barrels per day. With crude oil production declining, net petroleum imports during 1983 are expected to be 750 thousand barrels per day above their projected average for 1982. The expected increase in imports will result from inceasing domestic petroleum consumption and decreasing petroleum stock withdrawals. Domestic crude oil production is expected to continue to decline through 1985. (DMC)

19709 **(DOE/EIA—0109(82/12)) Petroleum supply monthly.** (USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas). Dec 1982. 103p. NTIS, PC A06/MF A01. Order Number DE83008088.

Data are presented on the supply, distribution, production, import, export and consumption of petroleum and petroleum products in the US during October, 1982. (DMC)

19710 **(DOE/EIA—0202(82/1Q)) Short term energy outlook. Volume I. Quarterly projections.** (USDOE Energy Information Administration, Washington, DC. Office of Energy Markets and End Use). Feb 1982. 65p. NTIS, PC A04/MF A01. Order Number DE83008097.

Updated forecasts are given for energy supplies, demand and prices at the national level with emphasis on petroleum. Individual forecasts are given for gasoline, distillate fuel oil, and residual fuel oil. Petroleum production, inventories, and imports are discussed. Natural gas, coal, and electricity are included. Changes in forecasting methodology were made in equations for electricity demand and for a group of petroleum products. Sensitivity case assumptions now include a factor reflecting uncertainty between preliminary data and model-estimates of demand and inventory changes. All methodological changes are detailed in the Appendices. (PSB)

19711 **(DOE/EIA—0202(82/2Q)-1) Short-term energy outlook. Volume 1. Quarterly projections.** (USDOE Energy Information Administration, Washington, DC. Office of Energy Markets and End Use). May 1982. 34p. NTIS, PC A03/MF A01. Order Number DE83008288.

This report provides projections for energy supplies, demands, and prices for the next several quarters and reviews recent major developments related to these projections. Three projections of petroleum supply and demand are presented based on low, medium, and high world oil price scenarios; however, the medium price scenario is emphasized. Detailed forecast tables are included at the end of the text. A section and table summarizing the world petroleum situation are included for the first time.

19712 **(DOE/EIA—0202(82/3Q)) Short-term energy outlook, quarterly projections.** (USDOE Energy Information Administration, Washington, DC. Office of Energy Markets and End Use). Aug 1982. 74p. NTIS, PC A05/MF A01. Order Number DE83008068.

The forecasts are produced using the Short-Term Integrated Forecasting System (STIFS). Two principal variables drive the STIFS model: the macroeconomic forecast and the world price of crude oil. The macroeconomic forecast, which is produced by Data Resources, Inc. (DRI), is adjusted by EIA in cases where EIA projections of the world price of crude oil differ from DRI estimates. The Oil Market Simulation Model is used to project the world oil price. The three projections for petroleum supply and demand are based on low, medium, and high world oil price scenarios. In general, the following discussion of the forecast refers to the medium price, or base case, scenario. Alternative cases, using varying assumptions about the level of economic activity, new car efficiency, weather, stock change uncertainty, and preliminary data uncertainty, are given for the forecasts of petroleum product demand and oil imports. Chapter 2 contains a substantially expanded coverage of developments in and the outlook for the world petroleum situation.

19713 **(DOE/EIA—0202(82/4Q)-1) Short-term energy outlook. Volume I. Quarterly projections.** (USDOE Energy Information Administration, Washington, DC. Office of Energy Markets and End Use). Nov 1982. 38p. NTIS, PC A03/MF A01. Order Number DE83008087.

The three projections for petroleum supply and demand based on low, medium, and high world oil price scenarios are revised. In general, the following discussion of the forecast refers to the medium price, or base case, scenario. Alternative cases, using varying assumptions about the level of economic activity, new-car efficiency, weather, stock change, and preliminary data uncertainty, are given for the forecasts of petroleum demand and oil imports.

19714 **(DOE/EIA—0361) Outlook for oil imports.** Lehr, M.D.; Zalkind, J. (USDOE Energy Information Administration, Washington, DC. Office of Energy Markets and End Use). Sep 1982. 23p. NTIS, PC A02/MF A01. Order Number DE83008073.

This report provides a detailed documentation concerning projections of oil imports to the United States. Two features characterize the oil import projections in all scenarios: (1) net oil imports are projected to reverse the decline of late 1981 and early 1982 and to climb to higher levels in 1985 than they held in 1981 or 1973 (though well below the peak in 1977); and (2) although varying trends are projected between 1985 and 1995, net oil imports through 1995 are never projected to recede below 2.6 million barrels per day, versus 5.1 in 1981. Payments for them are never projected to drop below 2.2% of the Gross National Product (GNP), versus 2.3% in 1981. The reversal and climb to higher import levels are projected because oil imports are the only readily usable fuel available in enough quantity to sustain economic growth during the next few years. The 1985 forecasts suggest that net oil imports will grow before price increases later in the decade and other factors can combine to bring about a gradual and permanent decline in oil imports. Varying trends are forecasted between 1985 and 1995 because of alternative assumptions about oil prices, economic growth, and domestic supply.

19715 **(LA—9677-MS) Economics of utility oil and gas substitution: national and region-specific analysis.** Mangeng, C.; Loose, V.; Stein, M.; Martinez, A.; Williams, D.; Bivins, R. (Los Alamos National Lab., NM (USA)). Feb 1983. Contract W-7405-ENG-36. 48p. NTIS, PC A03/MF A01. Order Number DE83008364.

Application of the Los Alamos Coal and Utility Modeling System to a region-specific analysis of utility substitution of coal and nuclear generation for oil- and gas-fired generation is described. Results indicate that adding new capacity according to the schedules announced by utilities in 1980 rather than more recently announced ones could save $33 billion in revenue requirements by the year 2010.

19716 **(NP—3901064) Swiss natural gas and petroleum research activities.** Frick, S.; Buechi, U.P. (Energieforum Schweiz, Bern (Switzerland)). 1981. 30p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83901064.

Topics covered include political and financial aspects and geological aspects. Individual sections were abstracted and indexed separately.

19717 **(P—102-82-002) Export restrictions on domestic oil: a California perspective.** Trexler, M.C. (California Energy Resources Conservation and Development Commission, Sacramento (USA)). Nov 1982. 153p. California Energy Commission, 1516 Ninth Street, Sacramento, CA.

As part of its ongoing investigation of California's energy security, the Energy Contingency Planning Committee of the California Energy Commission conducted a study of the West Coast implications of lifting export restrictions on domestic crude oil. In the past, significant impacts for California have been attributed to these export restrictions, particularly for Alaskan North Slope (ANS) oil. The Reagan Administration attempted to repeal these restrictions in 1981; another attempt is expected in 1983. Thi analysis shows that California has little to fear from a lifting of the export restrictions either in terms of its energy, economic, or environmental security. In addition, the incentive structure currently facing Alaskan oil producers makes exports only a marginally desirable option for them. The most significant decision variable for determining California's position on this issue may be its interest in promoting the economic well being of its Pacific Rim trading partners. Their security would be enhanced by access to secure supplies of United States domestic oil. Because California receives no benefits from the export restrictions on domestic oil, the state should support their removal in the interests of better Pacific Rim economic and political relations.

19718 **(PB—82-225996) California energy prices, 1980-2000. Staff report (final).** Cauchois, S.; Ward, D.; Merritt, M. (California Energy Resources Conservation and Development Commission, Sacramento (USA)). Jul 1981. 90p. NTIS, PC A05/MF A01.

California Energy Prices provides semiannual 20-year forecasts of electricity and primary fuel prices. Its purpose is to review current and past trends in energy prices as well as report on the California Energy Commission staff's periodic price forecasts made as part of the Biennial Report process.

19719 **(TVA—3901199) Tennessee energy statistics quarterly, third quarter 1982.** Johnson, K.L.; Matheny, R.R. (Tennessee Energy Authority, Nashville (USA)). Jan 1983. 35p. NTIS, PC A03/MF A01. Order Number DE83901199.

Energy production, consumption, and pricing are discussed. Data are tabulated for coal, petroleum, natural gas, and electricity. (PSB)

0208 Waste Management

REFER ALSO TO CITATION(S) 21702

19720 **(PB—82-231838) Emissions from refinery process heaters equipped with low-Nox burners. Final report Oct 80-Jan 81.** Todona, R.J.; Buening, H.J.; Hart, J.R. (KVB, Inc., Irvine, CA (USA)). Oct 1981. 183p. NTIS, PC A09/MF A01.

The report summarizes an investigation of the performance of commercial low-NOx burners in refinery process heaters. Refineries in Southern and Central California were surveyed to determine the number of existing or planned low-NOx burners. Tests on 10 process heaters equipped with low NOx burners measured gaseous emissions, particulates, and efficiencies at normal operating conditions. As-found NOx emissions increased from 58 to 245 ng/J as fuel-bound nitrogen increased from zero to 0.81%. In most cases, NOx concentrations were strongly influenced by excess air levels. Reducing excess air to 3-4% reduced NOx to 34-200 ng/J, depending on fuel nitrogen. Comparisons of present emissions data with past field test data for refinery heaters equipped with standard burners showed that (for mechanical-draft gas-fired heaters) low-NOx burners may reduce the NOx emission factor by 32-77% below the mean emission factor for standard burners. Three heaters (one firing gas; one, distillate oil; and one, residual oil) were selected as the most suitable candidates for 30-day continuous monitoring of gaseous emissions.

0209 Environmental Aspects

REFER ALSO TO CITATION(S) 19606, 19688, 19690, 19720, 21856, 21866, 21892, 21893, 22019, 22021

19721 **(AD-A—118372/2) Break-up of oil on rough seas - simplified models and step-by-step calculations. Final report.** Aravamudan, K.; Raj, P.; Ostlund, J.; Newman, E.; Tucker, W. (Little (Arthur D.), Inc., Cambridge, MA (USA)). Mar 1982. 199p. NTIS, PC A09/MF A01.

In this study, an attempt has been made to integrate the existing theoretical and experimental information regarding behavior of oil spills in the ocean into a unified, sequential calculation procedure. Major consideration has been given in the study to developing the least sophisticated calculation procedures which maintain a reasonable description of the totality of the physical processes. The principal phenomena included in the prediction of oil spill behavior are: combined spreading and evaporation, the interaction of waves within the slick with the slick and formation of oil droplets, dispersion of droplets in the water column and finally the formation and dispersion of slicklets due to turbulence in the ocean. The model has been exercised for four types of oils: light crude, heavy cruide, No. 2 fuel oil, and No. 6 fuel oil.

19722 **(AD-A—120221/7) The effects of weather systems, currents, and coastal processes on major oil spills at sea. Technical report.** Murray, S.P. (Louisiana State Univ., Baton Rouge (USA). Coastal Studies Inst.). 1982. 63p. NTIS, PC A04/MF A01.

Review of the effect of weather phenomena on continental shelves and coastal waters has clearly demonstrated their dominant role in forcing the motion of these waters. As the response of oil to wind forcing will be largely controlled by the type of weather characteristic of different climatic regions throughout the world, the paper will begin with a brief summary of the time and length scales of weather systems. Next, the oil dispersal problem will be discussed in terms of the physical and chemical properties of oil on the sea surface and then the geophysical processes (currents, tides, etc.) that experience has shown us to be important will be considered. Hydrodynamic details will not be emphasized, but rather case studies from major oil spills will next be called on to demonstrate the role of basic physical processes in determining oil motion. A brief review of the major types of models currently employed to aid in understanding or predicting oil spill movement will then be presented; it will be followed by a summary and evaluation of what I see to be the role physical oceanography will play in future oil spill incidents.

19723 **(AD-A—121827/0) Laboratory assessment of the changes in thermal properties of polar diving suit material when exposed to oils at low temperatures. Final report Sep 80-Feb 81.** Sinnarwalla, A.M.; Sundaram, T.R. (T.S. Associates, Inc., Columbia, MD (USA)). Feb 1981. 73p. NTIS, PC A04/MF A01.

The U.S. Coast Guard is evaluating the use of divers under ice as one means of oil-spill surveillance in arctic and subarctic regions. The degree of thermal protection provided to the diver by presently approved suits, which are made of neoprene foam lined on one or both sides by nylon fabric, under the combined action of oil, water and frigid temperature is not known. The present report describes the results of a laboratory study in which any changes in the thermal and physical properties of the suit material were assessed through systematic tests on small samples (12 in x 12 in) when they were kept immersed in various oils and oil-water mixtures at various temperatures (-4 c to +10 c) and periods of time (5 to 22 hours). Physical (length, volume, density) and thermal (conductivity) properties of the samples were measured before and after each test. The results show that, although the suit material performs well in general, under certain conditions the fabric lining as well as the foam absorb some oil and that this absorbed oil cannot be removed easily either by physical expression or by cleaning with commonly available detergents. The absorbed oil leads to some increases in density and in thermal conductivity, with the latter change for the 'Worst case' being about 35%.

19724 **(N—82-14557) Offshore petroleum industry environmental data requirements: emphasis on remote sensing.** Gratz, R.L. (Conoco Norway, Inc., Oslo). Jul 1981. 13p. NTIS, PC A13/MF A01.

ESA Appl. of Remote Sensing Data on the Continental Shelf.

Data quality and coverage requirements for the remote sensing of oceanographic and meteorological factors affecting the development of offshore hydrocarbon resources are considered, using a combination of fine-grid hindcasting and surface truth measurements. The establishment of data banks able to accumulate 20-30 years of climatological data for use in future designs is recommended. Special measurement programs are planned for data collection during storms. Remote sensing was used to measure several factors important to the petroleum industry, i.e., waves, winds, currents, and sea ice. Application to weather forecasting is shown. The use of surface truth data in the calibration and verification of measurements for remote sensing is suggested. Possible communications channels for the exchange of remote sensing data are assessed.

19725 **(N—82-14564) An evaluation of Seasat-A data in relation to optimum track ship weather routing and site specific forecasting for the offshore oil industry.** Daley, C.; Johnson, R.G.; Thomson, J.C. (Oceanroutes, Inc., Palo Alto, CA (USA)). Jul 1981. 10p. NTIS, PC A13/MF A01.

Appl. of Remote Sensing Data on the Continental Shelf.

The usefulness of Seasat-A SASS and altimeter measurements is reviewed. Five oceanic areas were selected: the Gulf of Alaska, central and western north Atlantic, eastern north Pacific, southern Indian Ocean, and the North Sea. Both Seasat-aided and conventional analyses were used in offshore hindcast and optimum ship routing situations. Where conventional observations are relatively dense, Seasat wind and wave data have greater impact in determining the shape of major map features than in positioning the features. In data sparse areas, Seasat data permit greater definition of surface features as well as their precise location. The use of Seasat data in optimum ship routing is quantified by means of comparative studies in the Gulf of Alaska.

19726 **(N—82-14573) The operational oil pollution surveillance system being used in France: forecasted future developments in consideration of the NATO/CCMS remote sensing pilot study conclusions.** Massin, J.M. (Ministere de l'Environment et du Cadre de Vie, Neuilly (France)). Jul 1981. 8p. NTIS, PC A13/MF A01.

Appl. of Remote Sensing Data on the Continental Shelf.

The requirements of an ideal system for detecting, identifying, classifying, mapping, and tracking oil spills are defined. A core package consisting of a human observer, photographic cameras, side-looking airborne radar, infrared/ultraviolet line scanner, and passive television is proposed. The French airborne remote sensing system is shown to satisfy these requirements. Problems with a remote sensing system able to operate under all weather conditions, transmitting specific information in real time which permits the identification of hydrocarbons without having to check in situ, are discussed. Satellite possibilities are estimated.

19727 **(N—82-14583) Oil spill identification by chemical analysis.** Grahl-Nielsen, O.; Wilhelmsen, S. (Bergen Univ. (Norway)). Jul 1981. 2p. NTIS, PC A13/MF A01.

Appl. of Remote Sensing Data on the Continental Shelf.

Gas chromatographic analyses of the relative amounts of phenanthrene and dibenzothiophene and their alkylated derivatives are shown to distinguish crude oils from different parts of the world and crude oils from different fields in the North Sea Ekofisk area. These aromatic hydrocarbons are relatively unaffected by weathering and can be used for matching oils from oil spills with unweathered samples from the suspected source. The method was used to identify the source of an oil spill in Bergen harbor. It is shown that analysis of the relative amounts of dibenzothiophenes is sufficient to discriminate between crude oils in most cases.

19728 **(N—82-14588) Use of side looking airborne radar (SLAR) for oil pollution monitoring in norway.** Hoest, S.E. (Norwegian Air Survey Co., Oslo). Jul 1981. 2p. NTIS, PC A13/MF A01.

Appl. of Remote Sensing Data on the Continental Shelf.

Integration of the system with a data annotation unit and a navigation system is outlined. Position data, date, time, and mission parameters are annotated on film. Data are also displayed on a TV monitor while the radar image and data can be recorded on an onboard video cassette recorder. The installation of the system and its operation are covered and its potential use in oil spill monitoring (particularly at night and in low visibility) is explained. Other possible uses are summarized (search and rescue missions, geology, oceanography) together with possible future extensions of the sensor package and survey aircraft.

19729 **(NP—3901018) Petroleum and pollution protection.** (Mineraloelwirtschaftsverband e.V., Hamburg (Germany, F.R.)). Oct 1981. 52p. (In German). NTIS (mf) (US Sales only).. Order Number DE83901018.

The variety of the influences of petroleum which affect the environment is demonstrated. It is to be pointed out that human existence is not possible without relying on the environment. Measures of the petroleum industry against the endangering of the environment by its products are described.

19730 **(OCS—76) Proposed 1983 outer continental shelf oil and gas lease sale offshore the Mid-Atlantic states. Final environmental impact statement.** (Minerals Management Service, New York (USA). Atlantic OCS Region). Dec 1982. 620p. Dept. of the Interior, Minerals Management Service, 18th & C Streets, NW, Washington, DC 20240.

The proposed action is the offering of a maximum of 4523 blocks (25.4 million acres; 10.3 million hectares) located from 8 to 195 statute miles offshore Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Delaware, Maryland, Virginia, and North Carolina for leasing in accordance with the Outer Continental Shelf Lands Act, as amended. The exact area to be offered will be based on the total number of unleased blocks wthin the boundaries of the proposed sale area at the time of the final Notice of Sale. Currently, there are 4416 unleased blocks within this area. The blocks lie in average water depths of 8 to 3550 meters (26 to 11,650 feet). In accordance with the 5-year OCS Oil and Gas Leasing Schedule, which was issued in July, 1982, Sale No. 76 will be held in April, 1983. Alternatives considered include a delay of the sale, cancelling the sale (no action), and three deletion options. The deletion options include one to protect biological resources, one to protect coastal resources, and one resulting from deepwater concerns. All blocks studied pose some degree of risk to the environment if developed. Mitigating measures, which may reduce the risk, have been identified.

19731 **(PB—82-231416) Oil spill response scenarios for remote arctic environments. Final report.** Schulze, R.H.; Grosskopf, W.G.; Cox, J.C.; Schultz, L.A. (Arctec, Inc., Columbia, MD (USA)). Mar 1982. 409p. NTIS, PC A18/MF A01.

Special problems occur during oil spill cleanup in remote inland areas in cold climates. In Alaska these problems result from the harsh climate, the unusual terrain features, and the special problems of spills along swift rivers. The analysis begins with a description of the environmental conditions that occur in Alaska that affect oil spill behavior and oil spill cleanup. The study then describes four spill scenarios in remote areas giving engineering details of the mechanics of the spill movement and the cleanup effort. One scenario covers a winter blowout of a well on the north slope tundra. The next involves a Trans-Alaska Pipeline spill. The fourth scenario involves a fuel tank truck spill into a sensitive sport fishing stream. The study describes the impact of these spills on the environment. Further, it provides a numerical evaluation of the effectiveness of the spill response effort and the cost effectiveness of three incremental levels of spill response for the cleanup effort.

19732 **(PB—82-255837) Manual of practice - chemical treating agents in oil spill control. Final report Sep 77-Dec 80.** Castle, R.W.; Foget, C.R.; Schrier, E. (Woodward-Clyde Consultants, San Francisco, CA (USA)). Jun 1982. 152p. NTIS, PC A08/MF A01.

The purpose of this manual is to provide the On-Scene Coordinator (OSC) with a systematic methodology consistent with national policy that can be used to assess the case-by-case acceptability of oil spill treatment using chemicals, and to determine appropriate application procedures. It contains guidelines for evaluating spill safety, determination of relevant spill characteristics, prediction of treated and non-treated spill movement, and criteria for comparison of probable impacts with and without treatment. Dispersion of oil at sea, dispersion on the shoreline, and the use of surface collecting agents are considered. The manual additionally describes general chemical agent application procedures and dosage regulation.

19733 **(PB—82-256116) Field manual for oil spills in cold climates. Final report Sep 78-May 79.** Deslauriers, P.C.; Morson, B.J.; Sobey, E.J. (Science Applications, Inc., Boulder, CO (USA)). May 1982. 177p. NTIS, PC A09/MF A01.

This manual documents the state-of-the-art response techniques as of early 1979. The manual has been divided into two basic parts: A field manual and supporting data. The field manual consists of a set of matrices that summarizes applicable techniques for various conditions. The on-scene coordinators will be able to use the matrices as a quick reference while they are responding to spills. The supporting data are a detailed summary of information on oil behavior and cleanup techniques. It was assumed that on-scene coordinators would have the opportunity to become knowledgeable enough about the material in this section so that only quick references to the field manual would be needed while responding to spills. It is also hoped that the on-scene coordinators will have had time to gather the information suggested (for example, maps delineating habitats and access roads) before the spill occurs. The ultimate success or failure of a response to an oil spill in cold regions will largely hinge on the on-scene coordinator's understanding of the information presented here and on his knowledge of the area in which the spill occurred.

19734 **(PB—83-114165) Results of an adaptive environmental assessment modeling workshop concerning potential impacts of drilling muds and cuttings on the marine environment. Workshop summary.** Auble, G.T.; Andrews, A.K.; Ellison, R.A.; Hamilton, D.B.; Johnson, R.A. (Fish and Wildlife Service, Fort Collins, CO (USA). Western Energy and Land Use Team). Oct 1982. 79p. NTIS, PC A05/MF A01.

This publication summarizes findings of a workshop held September 14-18, 1981, under a Federal Interagency Energy/Environment Agreement between the U.S. Environmental Protection Agency and the U.S. Fish and Wildlife Service. The U.S. EPA Environmental Research Laboratory, Gulf Breeze, Florida, was host for the sessions held on Pensacola Beach, FL. Discussions focused on information pertaining to fate and effects, identification of general relationships between drilling mud fluids and the marine environment, and identification of site-specific variables likely to determine impacts of drilling muds and cuttings in various marine sites. The workshop was structured around the construction of a model simulating fate and effects of discharges from a single rig into open waters of the Gulf of Mexico.

19735 **(PB—83-114538) Testing truck-mounted vacuum and air conveyor systems for oil spill recovery.** Gates, D.C.; Corradino, K.M. (Mason and Hanger-Silas Mason Co., Inc., Leonardo, NJ (USA)). Oct 1982. 43p. NTIS, PC A03/MF A01.

Two different vacuum truck designs were evaluated for oil recovery performance at the U.S. Environmental Protection Agency's Oil and Hazardous Materials Simulated Environmental Test Tank (OHMSETT) facility in September 1980. These were a Vactor Model 2045 air conveyor design made by the Meyers-Sherman Company and a standard vacuum truck made by Coleman Environmental and Pollution Control Equipment Co., Inc. Changes in recovery efficiency and oil recovery rate were found while varying oil slick thickness, oil viscosity, hose length, and air pump speed for the trucks. The air conveyor was additionally tested using different suction hose heights above the slick.

19736 **(PML—1979-41) Pollution of the soil by aviation gasoline.** Verweij, A. (Prins Maurits Lab. TNO, Rijswijk (Netherlands)). Aug 1979. 26p. (In several languages). NTIS, PC A03/MF A01.

A literature search was conducted to determine the effects of aviation gasoline spills and more general oil spills on the environment and on the condition of oil storage tanks. Remedial measures are presented. Attention is given to natural restoration processes as well as to actions to speed up these processes.

19737 **The cost of environmental regulations to the United States petroleum industry.** Sheppard, W.J. (Battelle Memorial Institute, Columbus, OH). *Oil and Petrochemical Pollution;* 1: No. 1, 49-57(1982).

Estimates of environmental control costs to the U.S. petroleum industry through 1990 are presented. No attempt has been made to compare the pollution control cost with the benefits of an improved environment. The cost is estimated between $16 and 65 billion, and the energy requirements are equivalent to a large refinery's capacity. Given the large costs, a careful benefit-cost analysis was recommended. (JMT)

19738 **Identification of mutagenic compounds in extracts of diesel exhaust particulates. Paper 81.56.1.** Petersen, B.A.; Chuang, C.C.; Margard, W.L.; Trayser, D.A. (Battelle, Columbus Lab, OH, USA). *Proceedings, Annual Meeting, Air Pollution Control Association;* vp(1981). (CONF-810631—).

From 74. annual meeting of the Air Pollution Control Association; Philadelphia, PA, USA (21 Jun 1981).

Exhaust gases form diesel engines were analyzed using different approaches and instruments to study the complex mixture of carbonaceous matter and gaseous components. The results demonstrate that a number of oxygenated polynuclear aromatic hydrocarbons (PAH) are present and also readily react with dilute nitric acid, particularly pyrene. They form nitrate derivatives which are powerful mutagens. 5 refs.

0220 Transport, Pipelines, And Handling

REFER ALSO TO CITATION(S) 19622, 19742, 19743

19739 **(KFK-PDV—222) Pipeline leak detection and location.** Courage, C.; Herforth, H.; Jansen, J.; Laier, D. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Projekt Prozesslenkung mit DV-Anlagen). Aug 1982. 63p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83750184.

The currently operational facilities for detecting and locating leakages in pipelines are only suitable to a limited extent for continuous monitoring in all operating phases. Using a computersimulated pipeline, various procedures were tested which offered potential improvements. The tests were concentrated on the detection and location of leakages under non-stationary operating conditions using the available measuring instruments. This made the use of a computer for the monitoring essential. Good results were shown by one procedure which gains important information from an on-line simulation on the variations with time of pressure and flow rate of a fluid pipeline. These reference values allow a comparison to be made with the measured values in all operating conditions. A special digital filter is used for leak detection. The measuring instruments need only fulfil minimum requirements concerning absolute accuracy.

19740 **(PB—82-239773) The inland distribution of the products of North Sea oil.** Pike, J. (Newcastle upon Tyne Univ. (UK). Transport Operations Research Group). Jan 1982. 37p. (RR—42). NTIS, PC A03/MF A01.

The objectives of the study were to assess the impact of the introduction of North Sea oil, in terms of: The proportions of production landed ashore and exported, as well as the factors conditioning this balance; the likelihood of the balance remaining stable in relation to future levels of output; the methods employed in bringing the crude ashore, e.g. size of vessels used, pipelines, the ports of landing and quantities received at each; the siting of new refineries and the type and timing of new port facilities to handle increased levels of production; the impact on the utilization of the existing capacity of the coastal fleet; ownership patterns of the existing fleet, future policies in relation to offshore oil and other traffic; and the impact on inland distribution patterns.

19741 **Flowmeter for determining average rate of flow of liquid in a conduit.** Kennerly, J.M.; Lindner, G.M.; Rowe, J.C. (to Dept. of Energy). US Patent 4,364,269. 21 Dec 1982. Filed date 30 Apr 1981. vp.

PAT-APPL-258971.

This invention is a compact, precise, and relatively simple device for use in determining the average rate of flow of a liquid through a conduit. The liquid may be turbulent and contain bubbles of gas. In a preferred embodiment, the flowmeter includes an electrical circuit and a flow vessel which is connected as a segment of the conduit conveying the liquid. The vessel is provided with a valved outlet and is partitioned by a vertical baffle into coaxial chambers whose upper regions are vented to permit the escape of gas. The inner chamber receives turbulent downflowing liquid from the conduit and is sized to operate at a lower pressure than the conduit, thus promoting evolution of gas from the liquid. Lower zones of the two chambers are interconnected so that the downflowing liquid establishes liquid levels in both chambers. The liquid level in the outer chamber is comparatively calm, being to a large extent isolated from the turbulence in the inner chamber once the liquid in the outer chamber has risen above the liquid-introduction zone for that chamber. Lower and upper probes are provided in the outer chamber for sensing the liquid level therein at points above its liquidintroduction zone. An electrical circuit is connected to the probes to display the time required for the liquid level in the outer chamber to successively contact the lower and upper probes. The average rate of flow through the conduit can be determined from the above-mentioned time and the vessel volume filled by the liquid during that time.

0230 Properties

REFER ALSO TO CITATION(S) 21459

0240 Storage

19742 **(AD-A—119019/8) A-e Services to perform a cathodic protection survey of the bulk fuel terminals at N.S.C. Pearl Harbor, Hawaii. Volume I. Report for Aug 81-May 82.** (Pacific Corrosion Research, Inc., Huntington Beach, CA (USA)). Jun 1982. 420p. NTIS, PC A18/MF A01.

The purpose of this corrosion survey was to inspect and checkout the existing cathodic protection systems of the underground metallic fuel lines and tanks at the Bulk Fuel Terminal, Naval Supply Center, Pearl Harbor, Hawaii. The corrosion survey was conducted from August 1981 to May of 1982. The corrosion survey was conducted on the following fuel tanks and fuel lines under Contract N62742-81-C-0006. The corrosion evaluation survey was conducted on the following fuel lines under Contract N62742-81-C-0006/P00002.

19743 **(AD-A—119026/3) A-e Services to perform a cathodic protection survey of the bulk fuel terminals at N.S.C. Pearl Harbor, Hawaii. Volume II.** (Pacific Corrosion Research, Inc., Huntington Beach, CA (USA)). Jun 1982. 296p. NTIS, PC A13/MF A01.

This section includes one 25,000 bbl, two 80,000 bbl, and two 150,000 bbl tanks in the Pearl City Tank Farm. Tanks in the upper tank farm consist of six 150,000 bbl tanks, eight underground diesel storage tanks at building 60, four 10,000 bbl underground surge tanks, two ballast tanks, two diesel tanks, one hot settling tank and one diesel flotation tank. Four 50,000 bbl tanks and one 80,000 bbl tank at the middle tank farm are included along with four 50,000 bbl tanks at the lower tank farm. One outdoor ballast tank and one water storage tank at the Stilling Basin and associated piping are also included. The existing impressed current type of cathodic protection system and the existing sacrificial type of cathodic protection system are considered and three POL lines located in the lower Red Hill Tunnel from the Red Hill storage tanks to the Pearl Harbor Naval Base are included.

19744 (DOE/EP—0045/1) Strategic Petroleum Reserve. Annual report. (USDOE Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness, Washington, DC. Office of the Deputy Assistant Secretary for Strategic Petroleum Reserve). 16 Feb 1983. 17p. NTIS, PC A02/MF A01. Order Number DE83008298.

This report discusses Reserve development activities during 1982 and includes: a detailed statement of the status of the Reserve; a summary of the actions taken to develop and implement the SPR Plan; an analysis of the impact and effectiveness of such actions on the vulnerability of the United States to interruption in supplies of petroleum products; a summary of existing problems with respect to further implementation of the SPR Plan; and any recommendations for supplemental legislation deemed necessary or appropriate by the Secretary of Energy to implement the Reserve Program. During 1982, the significant events for the Strategic Petroleum Reserve (SPR) Program included continued high oil acquisition and fill rates, execution of a second commercial crude oil purchase contract with the Mexican state oil company, continued Phase II storage capacity development, continuation of Phase III design and construction at expansion sites, submission to the Congress of a new drawdown plan, required under the Energy Emergency Preparedness Act of 1982, for use of the nation's SPR in case of a severe energy supply disruption, and submission of a report to the President and the Congress on the size of the SPR. Phase I development of five storage sites to achieve the capability to store 260 million barrels of oil was completed in 1980. Development of Phase II storage facilities (290 million barrels) continued on schedule during 1982 with cavern leaching at Bryan Mound, West Hackberry, and Bayou Choctaw and oil fill at Bryan Mound and West Hackberry. As of December 31, 1982, a total of 293.8 million barrels of crude oil was stored in the Strategic Petroleum Reserve.

19745 (DOE/EP—0046/4) Strategic Petroleum Reserve. Quarterly report. (USDOE Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness, Washington, DC. Office of the Deputy Assistant Secretary for Strategic Petroleum Reserve). 15 Feb 1983. 12p. NTIS, PC A02/MF A01. Order Number DE83008365.

During the first quarter of FY 1983, the Department of Energy continued to expand the storage capacity of the Strategic Petroleum Reserve (SPR) and to fill available storage capacity in the Reserve through purchases made in FY 1982. The SPR is being developed in three phases. Development of Phase I of the program consisting of approximately 260 million barrels of capacity (an increase of approximately 10 million barrels over prior estimates due to the acceptance of Sulphur Mines Cavern 2-4-5) was completed in 1980. Development of Phase II storage of 290 million barrels continues on schedule with the solution mining of the first three caverns completed in December 1982. Phase III construction at Bryan Mound is ongoing with drilling activities approximately 70 percent complete. Big Hill detailed design is nearing completion, and approximately 294 acres of land for the site were condemned in December 1982. The SPR was filled at a rate of 173,288 barrels per day during the calendar quarter ending December 31, 1982, and the total SPR crude oil inventory at the end of this period was 293,826,909 barrels. The weighted average cost of crude oil delivered to SPR terminals from October 1, 1982, through December 31, 1982, was $34.16 per barrel. Market conditions continue to be favorable for the purchase of oil to fill available SPR storage capacity. The SPR Petroleum Account became off-budget in FY 1982 pursuant to the Omnibus Budget Reconciliation Act of 1981. Funds for storage facilities development and operations, planning, and program direction continue to remain on-budget. Congress appropriated $2.074 billion to the PSR Petroleum Account for FY 1983.

19746 (DOE/PE/70267—T1) Strategic petroleum reserve: progress after seven years. Glatt, S. (Resources for the Future, Inc., Washington, DC (USA)). Jul 1982. Contract AC01-80PE70267;AC02-76CH00016. 132p. NTIS, PC A07/MF A01. Order Number DE83007162.

The goal of this work is to provide a single source of information on the SPR program, including its legislative and administrative bases, and to provide background for ongoing analyses of stockpiling issues. This report examines the SPR program by focusing on major matters of contention. These include its size, appropriate type of fill, choice of storage facilities, drawdown and distribution plans, procurement policies, financing options, costs, and role of the private sector. It describes the decisions made and actions taken which bear on these and related issues. The paper includes an extensive list of sources of information and analysis. This study brings together many of the major issues to present a comprehensive picture of the program in its development through early 1982. The discussion highlights difficulties in implementing a large, complex economic and engineering program. Chapter 1 gives a description of the background of strategic and critical materials stockpiling in this country, which places the Strategic Petroleum Reserve in its historical context. Chapter 2 examines the specific course of legislation which led to the establishment of the SPR and documents its present status. In Chapter 3, issues addressed by the policy makers are presented and the major issues of the size of the Reserve, types of storage facilities, location of the Reserve, type of fill, oil procurement strategies, drawdown and distribution, financing, industrial and private sector participation, and costs are discussed. The decisions taken and the yet unanswered questions are examined. Lastly, strategic stockpiling efforts in Japan, France, West Germany, Italy, and the Netherlands are reviewed to give a measure of comparison with the US SPR program. (DMC)

19747 (GAO/RCED—83-29) Status of strategic petroleum reserve activities as of September 30, 1982. (General Accounting Office, Washington, DC (USA). Resources, Community and Economic Development Div.). 15 Oct 1982. 32p. General Accounting Office, P.O. Box 6015, Gaithersburg, MD 20760.

During fiscal year 1982, about 78.6 million barrels of oil were delivered to the Strategic Petroleum Resrve, for an annual average fill rate of about 215,300 barrels per day. As of September 30, 1982, the Department of Energy reported that the Reserve contained about 277.9 million barrels. This report discusses a number of significant events, which occurred during the fourth quarter of fiscal year 1982, that affect the Reserve. It also discusses the progress being made in developing additional storage capacity for the Reserve.

0250 Combustion

REFER ALSO TO CITATION(S) 19627, 19629, 19630, 19632, 19633, 19634, 21011, 21301

19748 (PB—83-117069) Mechanisms of NO/sub x/ formation and control: alternative and petroleum-derived liquid fuels. England, G.C.; Heap, M.P.; Pershing, D.W.; Nihart, R.K. (Energy and Environmental Research Corp., Santa Ana, CA (USA)). 1981. 14p. NTIS, PC A02/MF A01.

The paper gives results of burning petroleum-, coal-, and shale-derived liquid fuels in a downfired tunnel furnace to assess the impact of fuel properties on the formation and control of NO/sub x/ emissions. A nitrogen-free oxidant mixture (Ar, CO_2, O_2) was used to isolate fuel NOx formation. Under excess air conditions, fuel NOx correlated well with total fuel nitrogen content for both the petroleum and alternate fuels. Under staged combustion conditions, the influence of fuel nitrogen content was much less pronounced but equally highly correlated except for coal-derived liquid. Exhaust NOx emissions were directly related to the amount of oxidizable nitrogen species leaving the first stage. NO, HCN, and NH_3 concentrations were measured in the fuel-rich zone of the staged combustor as a function of stoichiometry for seven liquid fuels and one CH_4/NH_3 mixture. Similar characteristics were observed for all liquid fuels. As the first stage stoichiometry (SR1) was reduced, NO concentrations at the first stage exit decreased; however, below SR1 = 0.8, HCN and NH_3 concentrations increased. Thus, the total fixed nitrogen (TFN = NO + HCN + NH_3) concentration passed through a minimum. Experimental data also indicated that increasing the temperature of the fuel-rich zone decreased TFN concentration which resulted in reduced exhaust NOx emissions.

03 NATURAL GAS

19749 **(PB—82-220559) Thermal endurance of construction materials at LNG facilities. Final report Oct 80-Sep 81.** Newman, J.S.; Vincent, B.G. (Factory Mutual Research Corp., Norwood, MA (USA)). Nov 1981. 109p. NTIS, PC A06/MF A01.

Construction materials utilized at LNG facilities are required to meet certain standards set by regulatory authorities and/or company specifications. Thermal endurance requirements are included in these standards and specifications and do, for the most part, refer to endurance tests conducted by nationally recognized approval and testing agencies. However, the tests performed by these agencies do not truly simulate the potential exposure afforded by contact with either LNG or an LNG fire. The objective of this program was to develop, in conceptual form, a test method or methods which could be used to effectively evaluate the thermal endurance of various construction materials in use at LNG facilities.

0301 Reserves

REFER ALSO TO CITATION(S) 19672, 19673

0302 Geology And Exploration

REFER ALSO TO CITATION(S) 19675, 19676, 19677, 19678, 19679, 19683, 22029

19750 **(DOE/ET/12140—1346) Final report of special geological, geochemical, and petrological studies of the Devonian shales in the Appalachian Basin.** Potter, P.E.; Maynard, J.B.; Pryor, W.A. (Cincinnati Univ., OH (USA). H.N. Fisk Lab. of Sedimentology). Jan 1980. Contract AC21-76ET12140. 97p. NTIS, PC A05/MF A01. Order Number DE83006387.

The purpose of this study was to describe the geology, petrology, lithology, sedimentology, and stratigraphy of the Devonian Shales in the Appalachian Basin in order to determine the potential for gas recovery. Specific study areas include Pine Mountain Overthrust, Brallier Formation, and Ohio Shale along Lake Erie. discussion is presented under the main headings: Chemical Characterization;composition, Fabric, Texture, Bedding, and paleontology; and Basin Analysis. Paleocurrent studies indicate that the depositional strike of the basin in upper Devonian time was north-south with but little variation and that sediment was uniformly derived from the east. The total volume of shale sequence in the Pine Mountain Overthrust is 254 cubic miles. The blowout zone of Young (1957) was identified stratigraphically. The siltstones of the Brallier Formation are of rather low primary reservoir quality. Similar tight siltstones in the Benson Field of West Virginia show moderate gas production. Mudrock in Brallier outcrops do not show promise as source rock. Stratigraphic units along Lake Erir, which contain abundant mudshales, siltshales, and siltstones, make the best gas reservoirs. All of these shale types contain quartz laminae and/or quartzase siltstone and siltshale beds which act as permeable reservoirs and conduits for gas even though some are cemented by carbonate. (DMC)

0303 Drilling, Production, And Processing

REFER ALSO TO CITATION(S) 19683

19751 **(PB—82-231648) Gas saturation in formation waters: Volume 1. Annual report Apr 80-Mar 81.** Randolph, P.L.; Rockar, E.M.; Osif, T.L. (Institute of Gas Technology, Chicago, IL (USA)). May 1981. 74p. NTIS, PC A04/MF A01.

Understanding the chemistry of brines from geopressured-geothermal formations is essential to the determination of the economics of production. This understanding is achieved by obtaining and analyzing down-hole (in-situ) fluid samples. The analytical results are compared to the results of surface sample analysis and to the results of thermodynamic modeling of this system.

19752 **(PB—82-231655) Gas saturation in formation waters: Volume 2. Annual report Apr 80-Mar 81.** Randolph, P.L.; Rockar, E.M.; Osif, T.L. (Institute of Gas Technology, Chicago, IL (USA)). May 1981. 147p. NTIS, PC A07/MF A01.

The purpose of this project is the development of a method for calculation of chemical equilibrium in support of Institute of Gas Technology Prime Contract No. 5011-321-0140 with the Gas Research Institute. The thrust of IGT's project is to develop laboratory capability for accurate analysis of brine samples recovered under in-situ conditions from geopressurized zones of coastal Texas and Louisiana.

0304 Products And By-products

REFER ALSO TO CITATION(S) 19687

0306 Marketing And Economics

REFER ALSO TO CITATION(S) 19647, 19648, 19649, 19683, 19691, 19710, 19711, 19715, 19716, 19718, 19719, 19730

19753 **(DOE/EI/10754—T17) Review of FRS and complementary pipeline data.** (Synergy, Inc., Washington, DC (USA)). 26 Oct 1981. Contract AC01-81EI10754. 60p. NTIS, PC A04/MF A01. Order Number DE83007290.

The potential for supplementing the Financial Reporting Systems (FRS) data collection system with data collected by the Federal Energy Regulatory Commission (FERC) for interstate natural gas pipeline companies. The approach here is to evaluate the potential for merging the FRS with the FERC Form 2 data in order to obtain additional information about interstate natural gas pipeline companies. A line-item by line-item comparison of the EIA-28 FRS form and the FERC Form 2 was made, both in a conceptual manner and by comparing actual data to determine if one form could be built from the other, and how much additional information could be provided by combining the two forms. Actual data were reviewed in order to evaluate that potential.

19754 **(DOE/EIA—0130(82/10)) Natural gas monthly.** (USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas). Oct 1982. 107p. NTIS, PC A06/MF A01. Order Number DE83008094.

This report, the Natural Gas Monthly (NGM), presents monthly and annual state and national level information on the supply and disposition of natural gas. in particular, the NGM includes data on natural gas production, storage, imports, exports, and consumption. Selected data are also presented on the activities of the major interstate pipeline companies, and on filings with the Federal Energy Regulatory Commission under the Natural Gas Policy Act of 1978. Marketed production of natural gas during the 6-month period ending June 1982, declined by 5.7 percent compared to a similar period in 1981, while wellhead prices rose from a 1981 average of \$2.00 to a level of \$2.29 in June 1982. Sales of natural gas by major interstate pipelines followed the same pattern of lower volumes and higher prices. Natural gas injected into storage is running slightly ahead compared to amounts injected last year.

US proved reserves of natural gas as of December 31, 1981, were 201,730 billion cubic feet, an increase of 1.4 percent over the 1980 level.

19755 **(DOE/EIA—0130(82/11)) Natural gas monthly.** (USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas). Nov 1982. 96p. NTIS, PC A05/MF A01. Order Number DE83008095.

This report presents data on the supply and disposition of natural gas in the USA during July 1982, as well as data on production, storage, imports, exports, and consumption. Selected data are also presented on the activities of the major interstate pipeline companies. Volumes of natural gas in storage continue to run slightly ahead of year-ago levels, especially for interstate operators. Weighted average prices received for gas sold by major interstate pipeline companies during July of 19982 ranged from a low of $2.61 per thousand cubic feet (Mcf) for Kansas-Nebraska to a high of $7.09 per Mcf for Pacific Gas. These variations are attributable to the sources of supply available to the various pipeline companies and the market structures of each. September 1982 applications for determination of a maximum lawful price under the Natural Gas Policy Act (NGPA) increased slightly for new gas (Section 102) and decreased significantly for high-cost gas (Section 107) when compared to August. Natural gas ceiling prices prescribed by the NGPA continued to move upward through the application of prescribed monthly inflation adjustments. In the 3-year period from November 1979 through November 1982, the price ceiling for new gas, for example, increased from $2.314 to $3.249 per million (MM) Btu's. The highest ceiling price permitted under the NGPA is natural gas produced from tight formations set for November 1982 at $5.396 per MMBtu. Market natural gas production during September of 1982 was 1444 billion cubic feet (Bcf) compared to the September 1981 level of 1578 Bcf. Consumption during the same period also declined from 1266 Bcf to 1176 Bcf.

19756 **(DOE/EIA—0130(82/12)) Natural gas monthly.** (USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas). Dec 1982. 92p. NTIS, PC A05/MF A01. Order Number DE83008289.

This report presents data on the supply and disposition of natural gas in the USA during August 1982, as well as data on production, storage, imports, exports, and consumption. Selected data are also presented on the activities of the major interstate pipeline companies. Marketed production of natural gas decreased 18.2% during August 1982, compared to August 1981, from 1706 billion cubic feet (Bcf) to 1471 Bcf. Consumption during the same period declined as well, from 1314 Bcf to 1153 Bcf. Commencing with this issue of the Natural Gas Monthly (NGM), estimates of marketed production are provided for two more recent months, September and October. Volumes of natural gas in storage continue to run slightly ahead of year-ago levels. The volume of natural gas purchased from producers and imported by major interstate natural gas pipeline companies continues to decline. In August 1981, 864 Bcf were purchased from producers, compared to 793 Bcf in August 1982. Imports during the same period declined from 62 Bcf to 46 Bcf. Applications for determination of a maximum lawful price under the Natural Gas Policy Act (NGPA) showed a significant increase between September and October 1982. The increase occurred principally for Section 103 classification wells (new onshore production wells), and for Section 107 classification wells (high-cost natural gas).

19757 **(DOE/EIA—0145(81)) Statistics of interstate natural gas pipeline companies: 1981.** Mack, J. (USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas). Oct 1982. 275p. NTIS, PC A12/MF A01. Order Number DE83008781.

This report presents financial and operating information on all Class A and B interstate natural gas pipeline companies operating in the United States during 1981. For accounting and reporting purposes, the FERC's Uniform System of Accounts defines Class A and B companies as follows: (1) Class A companies are those having annual gas operating revenues of $2,500,000 or more, and (2) Class B companies are those having annual gas operating revenues of more than $1,000,000 but less than $2,500,000. The 1981 financial and operating information presented in this report indicates that the 93 Class A and B interstate natural gas pipeline companies reported assets totaling $58.3 billion, as of December 31, 1981, compared with $48.8 billion on December 31, 1980. Gross gas utility plant investments at the end of the year amounted to $40.1 billion ($35.5 billion); and net gas utility plant assets amounted to $21.8 billion ($19.0 billion). The Class A and B pipeline companies reported total gas operating revenues of $55.7 billion ($45.3 billion), reflecting the effects of inflation and higher purchased gas costs. Sales of natural gas increased from 17.3 trillion cubic feet in 1980 to 17.8 trillion cubic feet in 1981. Sales of natural gas to ultimate consumers and to other gas utilities amounted to 3.3 trillion cubic feet (2.9 trillion cubic feet) and 14.5 trillion cubic feet (14.4 trillion cubic feet), respectively.Revenues from these sales amounted to $11.2 billion ($8.0 billion) and $42.1 billion ($35.3 billion). The total number of natural gas customers was 6,429,447 in 1981, compared with 5,274,757 in 1980. Of these, ultimate consumers totaled 6,426,546 (5,271,709) and 2901 (3048) wholesale gas utility customers.

19758 **(DOE/EIA—0357) Analysis of post-NGPA interstate pipeline wellhead purchases: an analysis of the Natural Gas Policy Act and several alternatives, Part III.** (USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas). Sep 1982. 159p. NTIS, PC A08/MF A01. Order Number DE83008025.

The purpose of this report is to analyze the market for natural gas at the wellhead as seen by major interstate pipeline companies. Among the issues addressed are: (1) what volumes of the various categories of natural gas are being purchased by interstate pipeline companies and what prices are being paid; (2) how much variation is there among companies in their average purchase prices of gas. How has the variation changed during the past year; (3) is there any evidence that old gas supplies are being reclassified to take advantage of higher price ceilings on new gas categories; and (4) what explains the volumes and prices of high-cost gas purchases. The data for the analysis presented here come from the Purchased Gas Adjustment (PGA) filings submited by major interstate pipeline companies to the Federal Energy Regulatory Commission and are presented under the classification: old gas, composed of all gas covered by NGPA Sections 104 (old interstate) and 106 (rollover contracts). Old gas is in general the lowest priced grouping. New gas, composed of all gas covered by NGPA Sections 102 (new gas), 103 (gas from new onshore production wells), 108 (stripper well gas), and 109 (certain other supplies). High-cost gas, composed of all gas covered by NGPA Section 107. The majority of these purchases are not subject to price control, and are priced at levels substantially above those that apply to other groupings. Miscellaneous, composed of small volumes of gas classified as interstate or covered by NGPA Sections 311 and 312. Total projected purchase volumes increased slightly (2%) between mid-1981 and mid-1982, accompanied by a more significant increase (17%) in the average of projected wellhead prices. Most of the increase in average prices was due to a shift of purchases away from the old gas to the more expensive categories, rather than to major price increases with individual gas categories.

19759 **(ORAU/IEA—83-1(M)) Analysis of industrial demand for natural gas.** Reister, D.B. (Oak Ridge Associated Universities, Inc., TN (USA)). Jan 1983. Contract AC05-76OR00033. 24p. NTIS, PC A02/MF A01. Order Number DE83008212.

Several analysts have proposed the theory that there is a frustrated demand for natural gas in the United States. According to this theory, the natural gas curtailments of the 1970s have convinced industrial users that natural gas is not reliable. The users are willing to but fuel oil at a premium and store it to assure a reliable energy supply. If this theory is correct, as the supply of natural gas becomes more reliable, natural gas should be able to recapture the market share it lost to fuel oil. To investigate this theory, a state-level data base on demand for fuel oil and natural gas by all manufacturing sectors for 1971 and 1974 to 1979 was developed. Then a model was developed to explain manufacturers' demand for fuel oil and natural gas during this period on the basis of fuel price and the availability of natural gas. Rather than a frustrated demand for natural gas, we find an excess demand for natural gas in several states.

Fuel oil may be able to capture the market from natural gas in these states.

19760 **(PB—82-227604) Pacific northwest industrial energy load analysis. Final report May 81-Feb 82.** Minton, G.R.; Schuldt, M.; Taussig, R.T. (Mathematical Sciences Northwest, Inc., Bellevue, WA (USA)). Feb 1982. 149p. (MSNW—82-3114). NTIS, PC A07/MF A01.

A study was carried out by Mathematical Sciences Northwest, Inc. (MSNW) to define research and development of technologies that will enhance the use of natural gas by Pacific Northwest industries. Both technological and economic/institutional factors were considered. The industries included food products; lumber and wood products; paper and allied products; chemicals and allied products; stone, glass and clay products; and primary metals. A variety of technologies were identified which showed promise either of increasing the efficiency of gas use or of adding new industrial uses for natural gas in the Pacific Northwest.

0308 Environmental Effects

REFER ALSO TO CITATION(S) 19730, 19734, 21892, 21893, 22021

19761 **(FOA-C—40141-C1) Formation and spreading of explosive and toxic gas clouds. A study of the literature.** Nyren, K.; Winter, S.; Hertzberg, O.; Karlsson, E. (Research Inst. of National Defence, Umea (Sweden)). Oct 1981. 98p. (In several languages). NTIS, PC A05/MF A01.

The outflow and aerosol formation at a leakage of pressurized condensed gas, gravity dispersion and the influence of the terrain on heavy gas, are emphasized. It is shown that gas escape, aerosol formation and dispersion of heavy gas on a plane surface are treated considerably more in international literature than the influence of the terrain on the behavior of a heavy gas. Models for calculating discharge and dispersion of heavy gas exist in several countries. Those models demand considerable background knowledge to be applied and recommendations are given how to plan the model work.

19762 **(PB—82-227646) Boiling and spreading rates of instantanteous spills of liquid methane on water. Final report Sep 80-Aug 81.** Chatlos, D.J.; Reid, R.C. (Massachusetts Inst. of Tech., Cambridge (USA). Dept. of Chemical Engineering). Apr 1982. 111p. NTIS, PC A06/MF A01.

Boiling and spreading rates of liquefied methane were measured in experiments where the cryogen was spilled on ambient water. Spills were essentially instantaneous, and the apparatus was one-dimensional in character. Boiling rates were initially high but decreased rapidly in a manner approximately inversely proportional to the square root of time. Asymptotic heat fluxes were near 25 kW/sq m. Ice formed quickly after the liquid methane contacted the water. Spreading rates were less than would have been expected if no boiling occurred. Analytical models were developed to correlate the spreading and boiling data.

0309 Artificial Stimulation

REFER ALSO TO CITATION(S) 19768, 19769

19763 **(DOE/MC/08216—1352) Evaluation of EL836 explosive stimulation of Devonian gas shale.** Barbour, T.G. (Science Applications, Inc., Fort Collins, CO (USA)). Jul 1980. Contract AM21-78MC08216. 65p. NTIS, PC A04/MF A01. Order Number DE83007141.

This report presents an evaluation of EL836, an explosive developed at E.I. duPont de Nemours and Company Laboratories, in stimulating gas shale. EL836 is a water gel type explosive with a high aluminum content. The computational evaluation of EL836 involved four one-dimensional cyclindrical geometry calculations to assess the influence of two equation-of-state descriptios of EL836, the effect or rock yielding and the effect of internal crack pressurization. Results of a computational evaluation of the EL836 explosive in stimulating Devonian gas shale suggest the following: Extensive plastic yielding will occur in a region immediate to the borehole. Extensive tensile fracture will occur in a region that begins at the outer boundary of plastic deformation and terminates at more than 100 borehole radii. Without a mechanism of ;near-wellbore fracture, such as crushing or pre-cracking during drilling or intentional borehole grooving, the plastic flow that occurs adjacent to the wellbore causes stress redistributions which prohibit early-time (less than a millisecond) tensile fracture immediate to the wellbore and thus prohibits gas penetration from the wellbore into the crack system. The barrier that the near-wellbore plastic zone presents to gas flow from the wellbore is reduced in radial dimension as time increases. Natural fractures in the wellbore wall or cataclysmic deformation and fracture adjacent to the wellbore, as a result of the explosive detonation, will likely assist in breaking down the barrier to gas flow. Very significatn enhancement is achieved in the EL836 stimulation treatment when gases penetrate the stress-wave induced radial cracks. Only minor differences were observed in the EL836 stimulation effects when comparison is made between two different explosive equations-of-state. 33 figures, 2 tables.

19764 **(DOE/MC/16015—1368-Vol.1) Chip desorption and pore-structure effects in methane release from coal. Final report.** Williams, F.L. (New Mexico Univ., Albuquerque (USA). Dept. of Chemical and Nuclear Engineering). Jan 1983. Contract AC21-81MC16015. 56p. NTIS, PC A04/MF A01. Order Number DE83007255.

Engineering aspects of methane release from coal have been studied in order to define the mechanisms which are operative during the delineation of methane by the chip desorption technique and during gas generation prior to crack flow into a production well. In addition, characterization of the surface area and pore structure of the test coal (Fruitland coal, San Juan Basin) revealed a basic understanding of methane storage mechanisms and resource delination strategies. This report consists of a summary of the task required accomplishments and copies of the other written material as appendices. As a result of our work, we have been able to conclude that: the chip desorption technique and associated lost-gas correction factors are valid coalbed methane delineation techniques; basin wide coalbed methane delineation is very site specific and seems to defy normal trend expectations; coalbed methane content appears to be geologically influenced much more strongly than limited by equilibrium adsorption capacity; diffusion of methane through coal should be described by a two parameter model which properly gives gas evolution rates over both short and long times; surface properties of coal as measured at low pressures do not seem to relate to the high pressure measurements of the methane adsorption capacity. As a result of this study, and the considerable field work associated with it, the DOE has promulgated a delineation technique and stimulated commercial activity in the San Juan Basin of northern New Mexico and southern Colorado. Recommendations for further work call for studies related to the completion and production strategies for particular basins. 17 figures, 8 tables.

19765 **(NMERDI—2-69-3304) Large-scale stimulation of a low-permeability Permian Pennsylvanian, gas reservoir.** Martin, F.D.; Stall, R. (New Mexico Inst. of Mining and Technology, Socorro (USA). New Mexico Petroleum Recovery Research Center). Jan 1983. 11p. New Mexico Energy Research and Development Institute, Information Center, 117 Richmond Drive, N.E., Albuquerque, NM 87106.

This project was a cooperative program with Yates Petroleum Corp. of Artesia, NM. The purpose of the project was to improve gas production from an existing well in the low-permeability Permian Pennsylvanian carbonate reservoir. After reviewing engineering and production data from 23 wells in the 50 sq-mile area investigated, the Griffin J.J. No. 1 was selected by Yates as being representative of most of the wells producing from this reservoir. Prior to the large-scale stimulation treatment, pressure buildup tests were conducted and analyzed. From this testing, the formation flow capacity was estimated to be 2.6 md-ft, the permeability was calculated to be 0.09 md, and a negative skin factor of about 4.0 was indicated. The very low skin effect suggested that a successful stimulation treatment must penetrate far away from the wellbore and intersect pockets of gas that were not flowing through the low-permeability flow paths. Proposed treatment programs were obtained from three different service companies. The program employed was a massive hydraulic fracture treatment that included 224,000 lbs. of 20 to 40 mesh sand, 140,000 gallons of gelled 2% KCL water, and 70,000 gallons of liquid CO_2. On September 22, 1981, this treatment was pumped into the Griffin well at an average treating pressure of 9000 psi. After some early production problems, the gas production two months after the treatment was approximately twice the pre-stimulation level. Four months after the stimulation, gas production was almost three times the rate prior to the treatment; to date, this increased production has been sustained for six months. Based on the observed increase in gas production, the massive fracture treatment was economically successful.

19766 **(PB—82-217654) Study on the propagation of hydraulic fractures in rocks (etude sur la propagation des fractures hydrauliques dans les roches). Final report.** Cornet, F.H. (Commission of the European Communities, Luxembourg). [nd]. 69p. (EUR—7287-FR). NTIS PC E04/MF E04.

The possibility of forming multiple hydraulic links between two deep wells by means of hydraulic fracturing was investigated. Isotropic rocks and those whose fracture behavior is anisotropic were considered. A mathematical model showed that for isotropic rocks, the fractures should align progressively parallel to the direction of the maximum principal stress in relation to the well where they originated.

19767 **(SAND—82-0282C) In-situ stress variations and hydraulic-fracture containment in layered rock: observations from a mineback experiment.** Teufel, L.W.; Warpinski, N.R. (Sandia National Labs., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 4p. (CONF-830401—1). NTIS, PC A02/MF A01. Order Number DE82010080.

From 5. ISRM congress; Melbourne, Australia (10 Apr 1983).

The purpose of this paper is to summarize the results of realistic in-situ experiments which have been conducted in an existing tunnel complex at the US Department of Energy's Nevada Test Site to examine hydraulic fracture propagation in layered rock under many different conditions. These facilities are ideal for hydraulic fracture experiments because they provide a realistic in-situ medium with the appropriate boundary conditions (in-situ stresses, with no face surfaces) yet still allow for detailed examination of the induced fractures and geological features through mineback. Although the experiments are conducted in layered, volcanic-tuffs and not sandstones and shales usually encountered in gas reservoirs, proper application of rock mechanics principles allows the extrapolation of these results to gas reservoir conditions. Small scale hydraulic fraxctures were created at various stratigraphic horizons in inclined, sub-horizontal boreholes drilled from an existing tunnel using dyed-water fracture fluid (0.6 m^3) injected at low rates (0.05 m^3/minute). The results of these experiments show that determination of the in situ stresses in a reservoir stratigraphic sequence is important for proper design of massive hydraulic fracture treatments, particularly for determining the height of the fracture. This would provide an estimate of whether stress magnitudes in the reservoir rock and bounding layers would result in containment of the fracture or enhance out-of-zone propagation and failure of the treatment. The magnitude of the required compressional stress difference in the bounding layers may depend on a number of factors, including the size of the fracture, fracture pressure, and fluid leakoff. These parameters will be evaluated in larger fracture experiments.

0320 Transport, Pipelines, And Handling

REFER ALSO TO CITATION(S) 19739

0330 Properties

19768 **(DOE/MC/08216—1330) Material properties of Devonian shale for stimulation-technology development.** Blanton, T.L.; Young, C.; Patti, N.C. (Science Applications, Inc., Steamboat Springs, CO (USA)). Oct 1980. Contract AM21-78MC08216. 47p. NTIS, PC A03/MF A01. Order Number DE83006484.

Material properties are used in the design of hydraulic fracturing treatments to establish a relation between the volume of fluid used in a job and the expected extent of the fracture. In Devonian shales this is important in determining the volume of fluid necessary to intersect the natural fracture system. In an attempt to provide a consistent and self-contained data base on the physical properties of Devonian shale, Science Applications has reviewed and collected previously generated data from numerous sources and has performed additional experiments so as to define the applicability of some of the quasi-static data to the evaluation of dynamic treatments. The review, experiments and evaluation which have been conducted on Devonian shale physical properties have resulted in the following principle conclusions: the elastic properties and yield surfaces defined by triaxial tests on Devonian shale may be significantly dependent upon shale type and organic richness, but a more systematic approach to core selection and testing will be required to establish correlations. Sufficient material property data for modeling and stimulation design exist only on a very site-specific basis, and more testing is required for identifying generic and regional trends. Dynamic experiments employing modified split-Hopkinson-bar techniques were so controlled by anisotropic sample failure that quantitative data on dynamic yield strength could not be obtained. There is a strong need for the development of experimental techniques and the generation of concordant data on the dynamic yield characteristics of Devonian shale at strain rates representative of explosive and tailored-pulse-loading. 9 figures, 17 tables.

19769 **(DOE/MC/08216—1332) Mechanical properties of Devonian shales from the Appalachian Basin.** Blanton, T.L.; Dischler; Patti, N.C. (Science Applications, Inc., Steamboat Springs, CO (USA)). 30 Sep 1981. Contract AM21-78MC08216. 174p. NTIS, PC A08/MF A01. Order Number DE83006477.

A prime objective of the current study has been to establish wherever possible regional or stratigraphic trends in the various properties required by stimulation research. Lithologically Devonian shales tend to fall into two categories: gray shales and organic-rich black shales. Two black/gray pairs, Huron/Hanover and Marcellus/Mahantango, were selected from four localities in Pennsylvania and Ohio for comprehensive testing. Over 130 experiments were run on these zones to determine elasticity, fracture properties, yield and ultimate strength, and ductility. The results of these tests and previous tests run on core from West Virginia and Kentucky provide a basis for the following conclusions about Devonian shale mechanical properties and their applications in stimulation research: elasticity of Devonian shale matrix material showed no strong trends with respect to either lithology, locality, or confining pressure. Gray shales tended to have a slightly higher Young's modulus than black shales, but the difference between the averages was less than the standard deviation of each average. Ultimate strength, yield strength, and ductility all increase with increasing confining pressure, which is typical for most rocks. Ultimate strength and yield strength tend to be higher for gray shales, whereas black shales tend to be more ductile. Tensile strength showed no particular trends either regionally or lithologically, whereas fracture energy seemed to have the most consistent trends of any material property measured. Black shales tended to have a higher fracture energy, and fracture energy for both black and gray shales tended to increase with depth of burial. Two promising topics for continued study are the effect of confining pressure on fracture energy and the effect of deformation rate on material properties. 16 figures, 9 tables.

19770 **(NBS-MONO—169) Thermophysical properties of normal butane from 135 to 700 K at pressures to 70 MPa.** Haynes, W.M.; Goodwin, R.D. (National Bureau of Standards, Boulder, CO (USA)). Apr 1982. 199p. GPO.

Using a modified version of the nonanalytic equation of state, thermophysical properties of normal butane are derived from physical properties data and are tabulated at integral temperatures from 135 to 700 K along isobars at pressures to 70 MPa. These isobar tables, along with a table for the saturated liquid, give values for densities, compressibility factors, internal energies, enthalpies, entropies, heat capacities, fugacities, sound velocities, dielectric constants, and isochore and isotherm derivatives. Equations, whose coefficients are determined from a least squares fit to selected experimental data, are also presented for vapor pressures, orthobaric liquid and vapor densities, ideal gas properties, second virial coefficients, dielectric constants, heats of vaporization, melting pressures, and orthobaric liquid specific heats, enthalpies, and entropies. Comparisons between experimental and calculated values for all properties considered here are reported in detail.

19771 **(NBS-MONO—170) Thermophysical properties of propane from 85 to 700°K at pressures to 70 MPa.** Goodwin, R.D.; Haynes, W.M. (National Bureau of Standards, Boulder, CO (USA). Thermophysical Properties Div.). Apr 1982. 252p. National Bureau of Standards, Washington, DC.

Thermophysical properties of propane are tabulated at integral temperatures over the entire range of fluid states from 85 to 700°K along isobars to 70 MPa by using a modified form of the nonanalytic equation of state. These tables, along with a table for the saturated liquid, include values for density, compressibility factor, internal energy, enthalpy, entropy, heat capacities, fugacity, sound velocity, dielectric constant, and isochore and isotherm derivatives. In addition to the equation of state, equations are presented for vapor pressures, orthobaric vapor and liquid densities, ideal gas properties, virial coefficients, dielectric constants, heats of vaporization, melting C, and orthobaric liquid specific heats, enthalpies, and entropies. Coefficients were determined by a least squares fit of selected experimental data, including several new sets of data not included in previous propane correlations. Comparisons between experimental and calculated values are given, including those for sound velocities, heat capacities, P-rho-T data, etc.

19772 **(PB—82-227679) Liquid-vapor equilibria for ternary natural gas systems. Annual report Sep 80-Sep 81.** Kidnay, A.J.; Sloan, E.D. (Colorado School of Mines, Golden (USA)). Sep 1981. 61p. NTIS, PC A04/MF A01.

Vapor liquid equilibrium (VLE) data were measured for the nitrogen + carbon dioxide binary system at 220 and 240K and for the methane + carbon dioxide system at 219.26, 240 and 270K. Ternary VLE measurements were made for the system N2 + CH4 + CO2 at 220K and 6.080, 9.119 and 12.159 MPa, 233.15K at 8.106 MPa, and 240K at 7.093, 9.119 and 12.159 MPa. The multifluid reference corresponding states method proposed by Teja and Rice was applied to VLE calculations and the results of this method for the binary and ternary systems were compared with the results of this method for the binary and ternary systems were compared with the results of the Lee-Kesler corresponding states correlation and the Peng-Robinson equation of state.

0340 Combustion

REFER ALSO TO CITATION(S) 21034

19773 **(AD-A—120047/6) Application of CARS to obtain temperature in flame environments. Final report.** Vanderhoff, J.A.; Kotlar, A.J. (Army Armament Research and Development Command, Aberdeen Proving Ground, MD (USA). Ballistics Research Lab.). Aug 1982. 49p. (ARBRL-TR—02417). NTIS, PC A03/MF A01.

A coherent anti-Stokes Raman scattering (CARS) experiment has been assembled and used to determine temperatures in various flame experiments. Using the Q-branch rotational-vibrational CARS signal from the N_2 molecule, temperature profiles in CH_4/air and CH_4/NeO premixed flames have been obtained. Additionally temperatures have been determined for H_2 and CH_4 diffusion flames using the CARS signal from the Q-branch of H_2. Several possible experiments in ballistics (muzzle flash and propellant strand burning) are discussed in the report.

0350 Storage

REFER ALSO TO CITATION(S) 21034

04 OIL SHALES AND TAR SANDS

0402 Site Geology And Hydrology

REFER ALSO TO CITATION(S) 19750

0403 Drilling, Fracturing, And Mining

REFER ALSO TO CITATION(S) 19763, 19788

19774 **(PB—83-114173) Equipping a shaft and mining bulk samples of oil shale, nahcolite and dawsonite. Report for Jan 78-Apr 81.** Amstutz, R.W. (Williams Bros. Engineering Co., Tulsa, OK (USA)). Apr 1981. 81p. NTIS, PC A05/MF A01.

A 5-year program was planned for environmental research and geotechnical test work at the Oil Shale Mining Environmental Research Facility in the central Piceance Creek Basin, Rio Blanco County, Colo. The facility consisted of a small-diameter lined shaft that would be equipped with a head frame, a hoist, and a surface plant to provide access to the deep, thick deposits of oil shale and the associated saline minerals including nahcolite and dawsonite. The objective of the research was to determine the potential effects of oil shale extraction upon the natural environment and the living and working environment, and to develop the technology required to resolve or mitigate the adverse effects. This report describes the equipping of the shaft and the mining of bulk samples of oil shale, nahcolite, and dawsonite from two levels.

19775 **(USBM-OFR—153(1)-82) Bureau of Mines oil-shale data bank. Part I. Bibliography. Volume 1.** Thill, R.E.; West, D.N.; Radcliffe, K.S.; Peterson, O.M. (Bureau of Mines, Washington, DC (USA)). 1981. 563p. Bureau of Mines, Washington, DC.

The data bank (OSDB) was created in 1976 to serve as a centralized source for the storage, retrieval, and dissemination of technical literature, patents, and information on research projects in oil shale. Thousands of bibliographic references, patents, and research projects relating to the mining of oil shale have been identified, abstracted, and indexed according to selected keyword topics. The bibliograhic section is arranged alphabetically by author and contains references and abstracts of literature pertaining to resource definition and the mining and processing of oil shale.

19776 **(USBM-OFR—153(2)-82) Bureau of Mines, oil shale data bank. Part 1 - bibliography: Volume 2.** Thill, R.E.; West, D.M.; Radcliffe, K.S.; Peterson, O.M. (Bureau of Mines, Washington, DC (USA)). 1982. 559p. Bureau of Mines, Dept. of Interior, Washington, DC.

The data bank (OSDB) was created in 1976 to serve as a centralized source for the storage, retrieval, and dissemination of technical literature, patents, and information on research projects in oil shale. Thousands of bibliographic references, patents, and research projects relating to the mining of oil shale have been identified, abstracted, and indexed according to selected keyword topics. The resulting data bank listings are contained in three sections. The bibliographic section is arranged alphabetically by author and contains references and abstracts of literature pertaining to resource definition and the mining and processing of oil shale.

19777 **(USBM-OFR—153(4)-82) Bureau of Mines oil shale data bank. Part III. Recent research projects.** Thill, R.E.; West, D.N.; Radcliffe, K.S.; Peterson, O.M. (Bureau of Mines, Washington, DC (USA)). 1981. 591p. Bureau of Mines, Washington, DC.

The data bank was created in 1976 to serve as a centralized source for the storage, retrieval, and dissemination of technical literature, patents, and information on research projects in oil shale. Thousands of bibliographic references, patents, and research projects relating to the mining of oil shale have been identified, abstracted, and indexed according to selected keyword topics. The resulting data bank listings are contained in three sections. Included specifically to provide awareness about recent oil shale research and aid in project planning, the recent research projects section describes work that is ongoing or completed in recent years. Each record includes the title of the research project, the performing organization, the principal and associate investigator(s), the start and completion dates, and a resume of the project objectives. The listing is arranged in roughly chronological ordre as provided by the Smithsonian Science Information Exchange.

19778 (USGS-OFR—153(3)-82) Bureau of Mines oil-shale data bank. Part II. Patents. Thill, R.E.; West, D.N.; Radcliffe, K.S.; Peterson, O.M. (Bureau of Mines, Washington, DC (USA)). 1981. 151p. Buresu of Mines, 4800 Forbes Avenue, Pittsburgh, PA 15213.

The data bank was created in 1976 to serve as a centralized source for the storage, retrieval, and dissemination of technical literature, patents, and information on research projects in oil shale. Thousands of bibliographic references, patents, and research projects relating to the mining of oil shale have been identified, abstracted, and indexed according to selected keyword topics. The patent section briefly describes patents relating to processes and equipment for the extraction of oil shale and recovery of shale oil. The patents are arranged achronologically by patent number, and contain selected information including the patent title, the inventor(s), assignee(s), patent date, and texts describing the essentials of the patent. Emphasis was made on selected topics concerning mining technology. Topics pertaining to the refining and upgrading of oil shale were not emphasized.

0404 Oil Production, Recovery, And Refining

REFER ALSO TO CITATION(S) 19775, 19776, 19777, 19778

19779 (LA—9614-PR) Explosively produced fracture of oil shale. Progress report, July-September 1982. (Los Alamos National Lab., NM (USA)). Feb 1983. Contract W-7405-ENG-36. 19p. NTIS, PC A02/MF A01. Order Number DE83008357.

The Los Alamos National Laboratory is conducting rock fragmentation research in oil shale to develop the blasting and fluid-flow technologies required to prepare a rubble bed for a modified in situ retort. The first section of this report summarizes the rock fragmentation program completed with the cooperation of the Oil Shale Consortium and Science Applications, Inc.; it also details the plans for a joint DOE/Sandia National Laboratories/Los Alamos program based on the results of the Consortium program. In addition, Sec. I describes the explosive engineering tests conducted to evaluate dead-pressing characteristics and to verify the reversal-plane fracture capabilities of the ANFO slurry explosive used in the Consortium program. The second section presents a paper on computer modeling and theory that relates the permeability of fractured rock to percolation theory and statistical crack mechanics.

19780 (N—8228697) The effects of lease size on yields from oil shale surface mines. Pei, R.Y.; Rubenson, D.S. (RAND Corp., Santa Monica, CA (USA)). Mar 1982. 36p. (RAND/N—1798-DOE). NTIS, PC A03/MF A01.

The effects of lease size and waste disposal policy on the amount of oil shale that can be recovered from an open pit mine are examined. Process facilities and waste disposal are considered, and the effects of federal leasing policy on the long-term potential of oil shale are assessed. Geometrical analysis of an open pit mine provided an understanding of the relation between lease size and resource recovery. The amount of recoverable oil shale was found to be limited to no more than 20 percent of the resource in place.

19781 (N—8228789) Steam reforming of n-hexane on pellet and monolithic catalyst beds. A comparative study on improvements due to heat transfer. (Jet Propulsion Lab., Pasadena, CA (USA)). Oct 1981. 46p. NTIS, PC A07/MF A01.

Monolithic catalysts with higher available active surface areas and better thermal conductivity than conventional pellets beds, making possible the steam reforming of fuels heavier than naphtha, were examined. Performance comparisons were made between conventional pellet beds and honeycomb monolith catalysts using n-hexane as the fuel. Metal-supported monoliths were examined. These offer higher structural stability and higher thermal conductivity than ceramic supports. Data from two metal monoliths of different nickel catalyst loadings were compared to pellets under the same operating conditions. Improved heat transfer and better conversion efficiencies were obtained with the monolith having higher catalyst loading. Surface-gas interaction was observed throughout the length of the monoliths.

19782 (NMERDI—2-69-3410) Pilot study on the isolation, metabolism and adaptation of microorganisms to Santa Rosa tar sand hydrocarbons. Phase II. Final report, June 17, 1982-July 17, 1982. Sanchez, G. (Eastern New Mexico Univ., Portales (USA). Dept. of Biology). Jan 1983. 17p. New Mexico Energy Research and Development Inst., 117 Richmond Dr., NE, Albuquerque, NM 87106.

This report describes and discusses additional work on a project which involved the use of microorganisms for increasing extraction efficiencies on tar sands. The study was conducted primarily on samples from the Santa Rosa Tar Sands (Guadalupe County, New Mexico). However, in order to be able to fully evaluate the results, parallel comparative studies were conducted on tar sand samples from an Alabama formation. A species of bacteria, Bacillus brevis, which had previously been isolated and adapted for growth on tar sands hydrocarbons was used. The results of the study indicate that bacterial action enhances the solvent extractability of crude from the tar sands. it was also found that sulfur and nitrogen contents of, especially, Santa Rosa tar sands are significantly reduced. Although the work is considered to be fairly conclusive it is suggested that further work and refinement is required. It is believed that the microbial process has merit but that the extraction efficiency can be improved by further work or perhaps the development of other micoorganisms.

19783 Combined fluidized-bed retort and combustor. Shang, J.Y.; Notestein, J.E.; Mei, J.S.; Zeng, L.W. US Patent Application 6-368,197. 14 Apr 1982. 15p.

The present invention is directed to a combined fluidized bed retorting and combustion system particularly useful for extracting energy values from oil shale. The oil-shale retort and combustor are disposed side-by-side and in registry with one another through passageways in a partition therebetween. The passageways in the partition are submerged below the top of the respective fluid beds to preclude admixing or the product gases from the two chambers. The solid oil shale or bed material is transported through the chambers by inclining or slanting the fluidizing medium distributor so that the solid bed material, when fluidized, moves in the direction of the downward slope of the distributor.

0405 Properties And Composition

REFER ALSO TO CITATION(S) 19748, 19768, 19769

19784 (PB—82-236936) Compendium of synfuel end use testing programs. Final report mar-sep 81. Ghassemi, M.; Quinlivan, S.; Haro, M. (TRW, Inc., Redondo Beach, CA (USA)). May 1982. 237p. NTIS, PC A11/MF A01.

The report gives information on major, recently completed, current, and planned synfuel end-use testing projects. It is intended to promote the flow of information between synfuel testing programs, thereby reducing the duplication of effort and enabling design and implementation of cost-effective and systematic approaches to the collection of appropriate environmental data in conjunction with on-going and planned performance testing projects. EPA plans to update this compendium to include results from current and future testing programs. Projects described in the compendium include testing of shale-derived fuels, SRC-II middle distillates, EDS fuel oils, H-coal liquids, and methanol/indolene mixtures in such equipment as utility boilers, steam generators, diesel engines (laboratory and full scale), auto engines, and other combustors. Published reports on testing and discussions with test sponsors/contractors are the sources of data for the compendium. Agencies/organizations providing input include DOD, DOE, NASA, EPRI, private synfuel developers, and engine manufacturers.

19785 (UCID—19738) Vapor pressure of shale oil and prediction of condenser performance. Bissell, E.R.; Burnham, A.K. (Lawrence Livermore National Lab., CA (USA)). 1 Mar 1983. Contract W-7405-ENG-48. 75p. NTIS, PC A04/MF A01. Order Number DE83008479.

Data are presented for the vapor pressure as a function of temperature for oil generated under Fischer Assay conditions from Anvil Points 24 gpt shale. Similar data are also given for the same oil after varying amounts up to 12% of the more volatile constituents have been distilled off. These data are then applied to estimation of the performance of condensers operated at various temperatures.

19786 Geotomorgraphy in oil shale. Daily, W.D.; Lytle, R.J.; Laine, E.F.; Okada, J.T.; Deadrick, F.J. (University of California, Lawrence Livermore National Laboratory, Livermore, California 94550). *Journal of Geophysical Research;* 87: No. B7, 5507-5516(10 Jul 1982).

Geophysical tomographs were made of oil shale at the Occidental Oil Shale, Inc., mine near DeBeque, Colorado. These tomographs mapped the in situ radio frequency electromagnetic attenuation of oil shale between 1 and 40 MHz in a plane 27 by 12 m. Measured attenuation rates (inverse skin depth) ranged from 0.1 to 0.5 m^{-1} with the attenuation rate approximately proportional to the square root of frequency. At 20 MHz, the measured relative permittivity of oil shale is about 9. Geotomographs were made in another plane 16.8 by 12 m, before and again after the shale in this region was explosively rubbled. Measured electromagnetic attenuation rates at 20 MHz were generally larger in the rubble than in the undisturbed shale suggesting that geotomography may be useful in mapping a characteristic of the rubbled zone such as void content or void size distribution. Model calculations of the rubble using a theory of dielectric mixtures predict a smaller attenuation rate in the rubble, implying that the measurements result from phenomena such as scattering or oil shale anisotropy, which are not accounted for in the model.

0406 Direct Uses And By-products

REFER ALSO TO CITATION(S) 19783

19787 (PB—82-249889) Combustion of oil shale in fluidized-bed combustors: an overview. Final report May-Nov 81. Roeck, D.R. (GCA Corp., Bedford, MA (USA). GCA Technology Div.). May 1982. 67p. NTIS, PC A04/MF A01.

The report gives an overview of the combustion of oil shale in fluidized-bed combustors. Oil shale can be combusted directly, or as a supplement to coal fuel, and can function as an SO2 sorbent in atmospheric fluidized-bed combustion (AFBC). Spent shale from retorting processes may provide for SO2 sorption and add some residual fuel value in AFBC. Commercial applications of direct combustion of oil shale in AFBC are limited, and known to exist only in Estonia (Soviet Union), China, and southern Germany. Pilot- and laboratory-scale combustion of shale and coal/shale mixtures in AFBCs in the U.S. has been investigated. A preliminary economic analysis indicates that substituting oil shale for limestone in an AFBC may have significant cost advantages, especially where shale (or spent shale) is readily available and at low cost.

0409 Waste Research And Management

REFER ALSO TO CITATION(S) 21707

19788 (RAND/N—1798-DOE) Effects of lease size on yields from oil-shale surface mines. Pei, R.Y.; Rubenson, D.S. (RAND Corp., Santa Monica, CA (USA)). Mar 1982. Contract AC01-80PE70271. 36p. NTIS, PC A03/MF A01. Order Number DE83008185.

This note examines the effects of lease size and waste disposal policy on the amount of oil shale that can be recovered from an open pit mine. It also considers process facilities and waste disposal, and assesses the effects of federal leasing policy on the long-term potential of oil shale. The relation between lease size and resource recovery depends on several factors, many of which are sensitive to specific lease conditions. Nonetheless, this study shows that an understanding of that relation can be obtained through geometrical analysis of an open pit mine. Our analysis shows that existing regulations limit the amount of recoverable oil shale to no more than 20% of the resource in place. This result is based on the assumption that oil shale waste products are continuously stored on site, but that they can be moved more than once (multiple handling) to increase resource recovery. If the economic constraints of single handling of wastes are considered, resource yield is limited to approximately 10%. Those low yields are the result of unfavorable area-to-depth ratio for the mines, which leaves large deposits of shale beneath the mine walls. Increasing lease size, and thus increasing the area-to-depth ratio, results in a higher yield. Significantly larger yields can be obtained by allowing larger leases or by maintaining existing lease size and allowing off-site disposal of wastes. Our analysis shows, however, that the need for off-site disposal lands is negligible for leases larger than 35,000 acres. Although off-site disposal increases yield for small leases, significant amounts of land are required for waste disposal. The contiguous nature of the Piceance Basin oil shale implies that these lands may contain large quantities of oil shale. Thus, although off-site disposal may be a simple method of improving yield for small leases, it could have an adverse effect on the long-range potential of recovering oil shale.

0410 Enviromental Aspects

REFER ALSO TO CITATION(S) 19602, 21685, 21707, 21711

0420 Regulations

REFER ALSO TO CITATION(S) 19668, 19669

05 NUCLEAR FUELS

0501 Reserves

REFER ALSO TO CITATION(S) 19673

19789 (GJBX—6(83)) Assessment of uranium potential for the NURE quadrangle evaluation program: the elicitation procedure. National Uranium Resource Evaluation. Mathews, G.W.; Marshall, S.F.; McClain, L.K. (Bendix Field Engineering Corp., Grand Junction, CO (USA)). Feb 1983. Contract AC13-76GJ01664. 24p. NTIS, PC A02/MF A01. Order Number DE83007328.

The Data Integration Group (DIG), Bendix Field Engineering Corporation, Grand Junction Operations, devised a method of integrating the results of National Uranium Resource Evaluation (NURE) quadrangle evaluation with the assessment of potential uranium resources. The procedure requires an interactive meeting of the quadrangle principal investigator(s), US Department of Energy (DOE) regional geologists, and DIG personnel. This meeting consists of two parts: a technical discussion, designed to ensure proper application of recognition criteria in the definition of favorable environments; and an elicitation of endowment-estimating variables. A standardized format for eliciting subjective probability estimates of volume and grade factors from the principal investigator(s) of each quadrangle encourages unbiased estimates and ensures adequate tracking of the geologic rationale used in making the estimates. 5 figures. 1 table.

0502 Exploration

REFER ALSO TO CITATION(S) 19789, 21639, 21640

19790 **(GJBX—11(83)) Computer-modeling codes to improve exploration nuclear-logging methods. National Uranium Resource Evaluation.** Wilson, R.D.; Price, R.K.; Kosanke, K.L. (Bendix Field Engineering Corp., Grand Junction, CO (USA)). Mar 1983. Contract AC13-76GJ01664. 17p. NTIS, PC A02/MF A01. Order Number DE83008322.

As part of the Department of Energy's National Uranium Resource Evaluation (NURE) project's Technology Development effort, a number of computer codes and accompanying data bases were assembled for use in modeling responses of nuclear borehole logging Sondes. The logging methods include fission neutron, active and passive gamma-ray, and gamma-gamma. These CDC-compatible computer codes and data bases are available on magnetic tape from the DOE Technical Library at its Grand Junction Area Office. Some of the computer codes are standard radiation-transport programs that have been available to the radiation shielding community for several years. Other codes were specifically written to model the response of borehole radiation detectors or are specialized borehole modeling versions of existing Monte Carlo transport programs. Results from several radiation modeling studies are available as two large data bases (neutron and gamma-ray). These data bases are accompanied by appropriate processing programs that permit the user to model a wide range of borehole and formation-parameter combinations for fission-neutron, neutron-, activation and gamma-gamma logs. The first part of this report consists of a brief abstract for each code or data base. The abstract gives the code name and title, short description, auxiliary requirements, typical running time (CDC 6600), and a list of references. The next section gives format specifications and/or directory for the tapes. The final section of the report presents listings for programs used to convert data bases between machine floating-point and EBCDIC.

19791 **(GJBX—14(83)) Application of NURE data to the study of crystalline rocks in the Wyoming uranium province.** Rush, S.M.; Anderson, J.R.; Bennett, J.E. (Bendix Field Engineering Corp., Grand Junction, CO (USA). Grand Junction Operations). Mar 1983. Contract AC13-76GJ01664. 138p. NTIS, PC A07/MF A01. Order Number DE83008323.

The Wyoming uranium province study is a part of the National Uranium Resource Evaluation (NURE) program conducted by Bendix Field Engineering Corporation for the US Department of Energy. The ultimate objective of the entire project is the integration of NURE and other data sources to develop a model for a uranium province centered in Wyoming. This paper presents results of the first phase of the Wyoming uranium province study, which comprises characterization of the crystalline rocks of the study area using NURE hydrogeochemical and stream-sediment data, aerial radiometric and magnetic data, and new data generated for zircons from intrusive rocks in the study area. The results of this study indicate that the stream-sediment, aerial radiometric, aerial magnetic, and zircon data are useful in characterization of the crystalline rocks of the uranium province. The methods used in this project can be applied in two ways toward the recognition of a uranium province: (1) to locate major uranium deposits and occurrences, and (2) to generally identify different crystalline rock types, particularly those that could represent significant uranium source rocks. 14 figures, 8 tables.

19792 **(GJBX—379(81)) Uranium hydrogeochemical and stream sediment reconnaissance of the Beaver NTMS quadrangle, Alaska. National Uranium Resource Evaluation.** D'Andrea, R.F. Jr.; Zinkl, R.J.; Shettel, D.L. Jr.; Langfeldt, S.L.; Hardy, L.C.; Hensley, W.K.; Thomas, G.J.; Martell, C.J.; Maassen, L.W. (comps.). (Bendix Field Engineering Corp., Grand Junction, CO (USA); Los Alamos National Lab., NM (USA)). Nov 1981. Contract AC13-76GJ01664. 98p. NTIS, PC A05. Order Number DE82007980.

The report presents results of a Hydrogeochemical and Stream Sediment Reconnaisance (HSSR) of the Ketchikan NTMS quadrangle, Alaska. In addition to this abbreviated data release, more complete data are available to the public in machine-readable form. These machine-readable data, as well as quarterly or semiannual program progress reports containing further information on the HSSR program in general, or on the Los Alamos National Laboratory (LANL) protion of the program in particular, are available from DOE's Technical Library at its Grand Junction Area Office. Presented in this data release are location data, field analyses, and laboratory analyses of several different sample media. For the sake of brevity, many field site observations have not been included in this volume, these data are, however, available on the magnetic tape. Appendices A and B describe the sample media and summarize the analytical results for each medium. The data have been subdivided by one of the Los Alamos National Laboratory sorting programs of Zinkl and others (1981a) into groups of stream-sediment, lake-sediment, stream-water, lake-water, and ground-water samples. For each group which contains a sufficient number of observations, statistical tables, tables of raw data, and 1;1,000,000 scale maps of pertinent elements have been included in this report. Also included are maps showing results of multivariate statistical analyses. Information on the field and analytical procedures used by the Los Alamos National Laboratory during sample collection and analysis may be found in any HSSR data release prepared by the Laboratory and will not be included in this report.

19793 **(GJBX—380(81)) Uranium hydrogeochemical and stream sediment reconnaissance of the Sterling NTMS quadrangle, Colorado. National Uranium Resource Evaluation.** Zinkl, R.J.; Shettel, D.L. Jr.; Langfeldt, S.L.; Hardy, L.C.; D'Andrea, R.F. Jr.; Garcia, S.R.; Hanks, D.; George, W.E.; Boliver, S.L. (comps.). (Bendix Field Engineering Corp., Grand Junction, CO (USA); Los Alamos National Lab., NM (USA)). Nov 1981. Contract AC13-76GJ01664. 111p. NTIS, PC A06. Order Number DE82007979.

This report presents results of a Hydrogeochemical and Stream Sediment Reconnaisance (HSSR) of the Sterling NTMS quadrangle, Colorado. In addition to this abbreviated data release, more complete data are available to the public in machine-readable form. These machine-readable data, as well as quarterly or semiannual program progress reports containing further information on the HSSR program in general, or on the Los Alamos National Laboratory (LANL) portion of the program in particular, are available from DOE's Technical Library at its Grand Junction Area Office. Presented in this data release are location data, field analyses, and laboratory analyses of several different sample media. For the sake of brevity, many field site observations have not been included in this volume, these data are, however, available on the magnetic tape. appendices A and B describe the sample media and summarize the analytical results for each medium. The data have been subdivided by one of the Los Alamos National Laboratory sorting programs of Zinkl and others (1981a) into groups of stream-sediment, lake-sediment, stream-water, lake-water, and ground-water samples. For each group which contains a sufficient number of observations, statistical tables, tables of raw data, and 1;1,000,000 scale maps of pertinent elements have been included in this report. Also included are maps showing results of multivariate statistical analyses. Information on the field and analytical procedures used by the Los Alamos National Laboratory during sample collection and analysis may be found in any HSSR data release prepared by the Laboratory and will not be included in this report.

19794 **(GJBX—381-81) Uranium hydrogeochemical and stream sediment reconnaissance of the Ketchikan NTMS quadrangle, Alaska. National Uranium Resource Evaluation.** D'Andrea, R.F. Jr.; Zinkl, R.J.; Shettel, D.L. Jr.; Langfeldt, S.L.; Hardy, L.C.; Minor, M.M.; McInteer, C.; Hansel, J.N.; Broxton, D.E. (comps.). (Bendix Field Engineering Corp., Grand Junction, CO (USA); Los Alamos National Lab., NM (USA)). Nov 1981. Contract AC13-76GJ01664. 106p. NTIS, PC A06. Order Number DE82007978.

This report presents results of a Hydrogeochemical and Stream Sediment Reconnaisance (HSSR) of the Ketchikan NTMS quadrangle, Alaska. In addition to this abbreviated data release, more complete data are available to the public in machine-readable form. These machine-readable data, as well as quarterly or semiannual program progress reports containing further information on the HSSR program in general, or on the Los Alamos National Laboratory (LANL) portion of the program in particular, are available from DOE's Technical Library at its Grand Junction Area Office. Presented in this data release are location data, field analyses, and laboratory analyses of several different sample media. For the sake of brevity, many field site observations have not been included in this volume, these data are, however, available on the magnetic tape. Appendices A and B describe the sample media and summarize the analytical results for each medium. The data have been subdivided by one of the Los Alamos National Laboratory sorting programs of Zinkl and others (1981a) into groups of stream-sediment, lake-sediment, stream-water, lake-water, and ground-water samples. For each group which contains a sufficient number of observations, statistical tables, tables of raw data, and 1;1,000,000 scale maps of pertinent elements have been included in this report. Also included are maps showing results of multivariate statistical analyses. Information on the field and analytical procedures used by the Los Alamos National Laboratory during sample collection and analysis may be found in any HSSR data release prepared by the Laboratory and will not be included in this report.

19795 (GJBX—383(81)) **Probabilistic endowment appraisal system based upon the formalization of geologic decisions. National Uranium Resource Evaluation. Final report: demonstration and comparative analysis of estimates and methods.** Harris, D.P.; Carrigan, F.J. (Bendix Field Engineering Corp., Grand Junction, CO (USA); Arizona Univ., Tucson (USA). Dept. of Mining and Geological Engineering). Dec 1980. Contract AC13-76GJ01664. 135p. NTIS, PC A07. Order Number DE82010923.

This report is the culmination of approximately three and one-half years of research on the design and demonstration of a mineral endowment appraisal system which has as its foundation a formalization of geological decisions within a probabilistic framework. Basically, the probabilistic decision structure of a geologist or team of geologists is captured in a system of computer programs which can be used by a geologist for the estimation of the magnitude of uranium endowment by providing information to this system about the states of earth processes and geologic conditions that pertain to that region being evaluated. Research performed under this contract had two main objectives: demonstration of the endowment appraisal system on the San Juan Basin of New Mexico; a comparison of estimates by the appraisal system with estimates made using other methodologies. The scope of this report is restricted to a demonstration of the appraisal system and the comparison of system estimates for aggregates of stratigraphic units with estimates made by other methodologies. Estimates by geographic subdivision (partitions) of formational units are not presented in the report; however, these estimates are provided, along with input data, in Appendix IV of this report. Similarly, documentations of computer programs and instructions for use of the system are presented in Appendix III. Paleogeologic maps and other information related to the implementation of the appraisal system and to its demonstration are provided in Appendix V. The conceptual and theoretical bases for some of the computations that are made by the appraisal system are described in Appendices I and II. The two reports which were submitted as research reports in fulfillment of contract 77-040-E are included as Appendix I and Appendix III-B.

0503 Mining

REFER ALSO TO CITATION(S) 19886, 19893

0504 Feed Processing

REFER ALSO TO CITATION(S) 19881, 21955, 21963

19796 **Separation of zirconium and uranium.** MacDonald, D.J.; Henry, H.G. US Patent Application 6-363 367. 30 Mar 1982. 11p.

Zirconium- and uranium-containing hydrocarbon-amine solutions are treated for separation of zirconium and uranium by means of a process comprising: (1) selctive stripping of zirconium with an aqueous chloride solution, and (2) scrubbing the resulting aqueous solution with chloride-loaded hydrocarbon-amine solution to selectively remove uranium, thereby yielding an aqueous zirconium solution of low uranium content.

0505 Enrichment

REFER ALSO TO CITATION(S) 21363

19797 **Isotope separation apparatus and method.** Cotter, T.P. (to Dept. of Energy). US Patent 4,366,379. 28 Dec 1982. Filed date 5 Jun 1978. vp.

PAT-APPL-912783.

The invention relates to a method and apparatus for laser isotope separation by photodeflection. A molecular beam comprising at least two isotopes to be separated intersects, preferable substantially perpendicular to one broad side of the molecular beam, with a laser beam traveling in a first direction. The laser beam is reflected back through the molecular beam, preferably in a second direction essentially opposite to the first direction. The laser beam comprises pi-pulses of a selected wavelength which excite unexcited molecules, or cause stimulated emission of excited molecules of one of the isotopes. Excitation caused by first direction pi-pulses moves molecules of the isotope excited thereby in the first direction. Stimulated emission of excited molecules of the isotope is brought about by returning pi-pulses traveling in the second direction. Stimulated emission moves emitting molecules in a direction opposite to the photon emitted. Because emitted photons travel in the second direction, emitting molecules move in the first direction. Substantial molecular movement is accomplished by a large number of pi-pulse-molecule interactions. A beam corer collects the molecules in the resulting enriched divergent portions of the beam.

19798 **Method for selectively removing fluorine and fluorine-containing contaminants from gaseous UF$_6$.** Jones, R.L.; Otey, M.G.; Perkins, R.W. (to Dept. of Energy). US Patent 4,364,906. 21 Dec 1982. Filed date 24 Nov 1980. vp.

PAT-APPL-209920.

This invention is a method for effecting preferential removal and immobilization of certain gaseous contaminants from gaseous UF$_6$. The \contaminants include fluorine and fluorides which are more reactive with CaCO$_3$ than is UF$_6$. The method comprises contacting the contaminant-carrying UF$_6$ with particulate CaCO$_3$ at a temperature effecting reaction of the contaminant and the CaCO$_3$.

0507 Fuels Production And Properties

REFER ALSO TO CITATION(S) 19881, 19896, 19897, 19898

19799 (CONF-8106164—3) **Consistency in thermophysical properties: enthalpy, heat capacity, thermal conductivity and thermal diffusivity of UO$_2$.** Fink, J.K.; Chasanov, M.G.; Leibowitz, L. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 29p. NTIS, PC A03/MF A01. Order Number DE83007926.

From National Bureau of Standards joint conferences: 8. symposium on thermophysical properties; 17. thermal conductivity conference; 8. thermal expansion conference; Gaithersburg, MD, USA (15 Jun 1981).

Equations have been derived for the enthalpy, heat capacity, thermal conductivity, and thermal diffusivity of UO$_2$. In selection of these equations, we considered the traditional criterion of lowest relative standard deviation between experimental data and the function chosen to fit these data as well as consistency between the thermophysical properties. In the latter case, we considered consistency in (1) thermodynamic relations among properties, (2) the choice of physical phenomena on which to base the theoretical formulation of the equations, and (3) the existence and temperature of phase transitions. 6 figures, 3 tables.

19800 (Juel-Conf—43, pp 30-42) **Graphite corrosion due to water vapour.** Kubaschewski, P.; Heinrich, B. Nov 1981. (In German). NTIS (US Sales Only), PC A07/MF A01.

From Seminar of the KTG on chemistry and nuclear waste disposal; Juelich, F.R. Germany (5 Nov 1981).

The mathematical and experimental data found out for the fuel element graphite are used to calculate the corrosion of individual spheres (A3 graphite, AVR fuel elements) during the period of their stay in the THTR-type reactor.

0508 Spent Fuels Reprocessing

REFER ALSO TO CITATION(S) 19899, 21231, 21232, 21365, 21366, 21799

19801 (Juel-Conf—43, pp 123-131) **Chemistry of nuclear waste disposal.** Zimmer, E. Nov 1981. (In German). NTIS (US Sales Only), PC A07/MF A01.

From Seminar of the KTG on chemistry and nuclear waste disposal; Juelich, F.R. Germany (5 Nov 1981).

In extractive purification of the low-enriched uranium fuel element (UO_2-particle fuel element with SiC coating) no problems arise in the PUREX-process which have not already been solved when reprocessing LWR-type reactor and breeder fuel elements. Concerning the HTR-type reactor fuel elements containing thorium, there are two process cycles behind the head end; the pure U-235 is reprocessed in the same manner as the low-enriched uranium fuel, and the thorium, which is the bigger fraction, is reprocessed together with U-233 in the same manner as the mixed oxides. Only the CO_2-off gas system, which contains krypton and carbon 14, leads to difficulties in nuclear waste disposal.

19802 (RFP—3311) **Chemical systems engineering progress report, January-December 1981.** Erfurdt, R.J. (Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant). 5 Feb 1983. Contract AC04-76DP03533. 118p. NTIS, PC A06/MF A01. Order Number DE83007465.

Activities in the following areas are reported: instrumentation systems, waste systems, remote engineering, and component development. (DLC)

19803 **Mercuric iodate precipitation from radioiodine-containing off-gas scrubber solution.** Bosuego, G.P.; Partridge, J.A. (to Dept. of Energy). US Patent 4,362,660. 7 Dec 1982. Filed date 14 Jul 1980. vp.

PAT-APPL-168979.

Mercuric nitrate-nitric acid scrub solutions containing radioiodine may be reduced in volume without excessive loss of volatile iodine. The use of concentrated nitric acid during an evaporation process oxidizes the mercury-iodide complex to a less volatile mercuric iodate precipitate.

19804 **Plutonium aerosols size distribution in a reprocessing plant.** Perrin, M.L.; Madelaine, G. pp vp of Aerosols in science, medicine and technology. Stoeber, W.; Hochrainer, D. (eds.). Bad Soden, Germany; Gesellschaft fuer Aerosolforschung e.V. (1981).

From Conference on aerosols in science and technology - aerosols in and from in and from industrial processes; Duisburg, F.R. Germany (23 Sep 1981).

Concern regarding the potential release of radioactive particles in the atmosphere is actually increasing. Because of this interest, a field sampling programm is in progress in the reprocessing plant of LA HAGUE to estimate the atmospheric radioactive contamination by plutonium aerosols. This paper concerns the measurement of size characteristics of plutonium aerosols generated by typical operations of the reprocessing.

19805 **Aerosol generation from Kerosene fires.** Jordan, S.; Lindner, W. pp vp of Aerosols in science, medicine and technology. Stoeber, W.; Hochrainer, D. (eds.). Bad Soden, Germany; Gesellschaft fuer Aerosolforschung e.V. (1981). (In German)

From Conference on aerosols in science and technology - aerosols in and from in and from industrial processes; Duisburg, F.R. Germany (23 Sep 1981).

The course of solvent surface fires is dependent on the surface area on fire; depth of pool and solvent composition do not influence the fire rate. But the fire rate increases rapidly with the burning area. The residual oxygen concentration after a fire in a closed container is dependent on the violence of the fire, i.e. on the burning surface. Moreover the ending of the fire is influenced by the TBP-concentration of the solvent. With sufficient supply of solvent the TBP-concentration changes only slightly during the fire, so that a fire at 14% O_2-concentration is extinguished within the container. With the TBP-concentration changing considerably, i.e. little mass, a fire with a similar burning surface is already extinguished at an O_2-content of 18%. The aerosol generation depends on the fire rate, and so it is higher in free atmosphere than in closed containers. The soot production in the mixture fire (kerosene /TBP 70/30) is higher by a factor 7 than in the pure kerosene fire. Primary soot-particles have a diameter of approximately 0,05 μm and agglomerate rapidly into aggregates of 0,2-0,4 μm.

19806 (DP-tr—38) **Contribution to the study of the behavior of fission-product niobium during the reprocessing of spent nuclear fuel.** Gue, J.P. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.; CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France). Dept. of Chemistry). 1976. Contract AC09-76SR00001. Translation of CEA-R-4805. 94p. NTIS, PC A05/MF A01. Order Number DE83008151.

The parasitic extraction of certain metals in nitric acid by tributyl phosphate (TBP), or its primary degradation product dibutylphosphoric acid (HDBP), often limits the purification of uranium and plutonium during the reprocessing of spent nuclear fuel. In this study we have attempted to bring some precision to the chemistry of niobium in nitric acid and have specifically investigated its colloidal components and their extraction by TBP and HDBP diluted in dodecane. Using specific methods to study colloidal states, such as ultracentrifugation, zone electrophoresis, coherent light scattering, and electron microscopy, we have examined and described these hydrosols. The first features which became evident throughout this study are: very great polydispersity and poor reproducibility of sols; properties which we usually associate with nicellar colloids, especially in the family of colloidal hydroxides. In the mixture of TBP, HDBP, and dodecane, niobium's general behavior is not fundamentally altered. However, the high value of the distribution coefficient of HDBP in the presence of TBP limits sol coagulation, but increases sol solubility in the organic phase. In this case, the two zones overlap. The behavior of colloidal niobium hydroxide can explain the phenomena generally observed with fission-product niobium in nuclear fuel reprocessing plants. The behavior of niobium in plants can be characterized as follows: instability in fuel-dissolution nitric acid; accumulation, often significant, at TBP extraction interfaces; increased extraction by radiochemical formation of HDBP; and retention in organic phase after reextraction of fissile material (U and Pu). While our study may provide a good account of the behavior of fission-product niobium during the reprocessing of spent nuclear fuel, it does not offer simple solutions to reduce parasitic extraction of this element.

0509 Transport And Storage

REFER ALSO TO CITATION(S) 19831, 21356, 21364

19807 (EPRI-NP—2812) **Development and test of methods for the nondestructive assay of spent-fuel assemblies. Final report.** Untermyer, S. II. (National Nuclear Corp., Mountain View, CA (USA)). Jan 1983. 48p. NTIS, PC A03/MF A01. Order Number DE83901588.

Several methods were tested for the non-destructive assay of irradiated nuclear fuel assemblies stored in water-filled pools: burnup measurement by neutron emission; residual fissile measurement by multiplication change with boron displacement; and residual fissile measurement by neutron-source multiplication. It was found that both burnup and residual fissile content could be measured through counting neutron emission from the fuel, both with and without a neutron source. Accuracy of 770 MWD/MTU was attained in burnup determination, while residual fissile content measurements had errors of about 0.1% absolute in fissile content. Still more accurate fissile content measurements appear possible, since the statistical uncertainties in fissile assay (neglecting systematic errors) are estimated to be 0.016% absolute in fissile content. Thus it appears to be practical to assay irradiated fuel assemblies to high accuracy while stored in fuel-storage pools. Further development is recommended, however, to test out the practical limits of precision attainable with this procedure.

19808 (NUREG—0383-Vol.1-Rev.5) Directory of Certificates of Compliance for Radioactive-Materials Packages. Summary report of NRC approved packages. (Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Material Safety and Safeguards). Jan 1983. 403p. NTIS, PC A18/MF A01 - GPO $9.50. Order Number DE83901461.

This directory contains a Summary Report of the US Nuclear Regulatory Commission's Approved Packages (Volume I), all Certificates of Compliance (Volume 2), and Summary Report of NRC Approved Quality Assurance Programs (Volume 3) for Radioactive Material Packages effective December 31, 1982. The purpose of this directory is to make available a convenient source of information on packagings which have been approved by the US Nuclear Regulatory Commission. To assist in identifying packaging, an index by Model Number and corresponding Certificate of Compliance Number is included at the back of Volumes 1 and 2 of the directory. A listing by packaging types is included in the back of Volume 2. An alphabetical listing by company name is included in the back of Volume 3 for approved QA programs. The Summary Reports include a listing of all users of each package design and approved QA programs prior to the publication date of the directory.

19809 (NUREG—0383-Vol.2-Rev.5) Directory of Certificates of Compliance for Radioactive-Materials Packages. Certificates of Compliance. (Nuclear Regulatory Commission, Washington, DC (USA). Div. of Fuel Cycle and Material Safety). Jan 1983. 612p. NTIS, PC A99/MF A01 - GPO $12.00. Order Number DE83901510.

This directory contains a Summary Report of the US Nuclear Regulatory Commission's Approved Packages (Volume I), all Certificates of Compliance (Volume 2), and Summary Report of NRC Approved Quality Assurance Programs (Volume 3) for Radioactive Material Packages effective December 31, 1982. The purpose of this directory is to make available a convenient source of information on packagings which have been approved by the US Nuclear Regulatory Commission. To assist in identifying packaging, an index by Model Number and corresponding Certificate of Compliance Number is included at the back of Volumes 1 and 2 of the directory. A listing by packaging types is included in the back of Volume 2. An alphabetical listing by Company name is included in the back of Volume 3 for approved QA programs. The Summary Reports include a listing of all users of each package design and approved QA programs prior to the publication date of the directory.

19810 (NUREG—0383-Vol.3-Rev.2) Directory of Certificates of Compliance for Radioactive-Materials Packages. Summary report of NRC approved quality assurance programs for radioactive material packages. (Nuclear Regulatory Commission, Washington, DC (USA). Div. of Fuel Cycle and Material Safety). Jan 1983. 140p. NTIS, PC A07/MF A01 - GPO $6.00. Order Number DE83901532.

This directory contains a Summary Report of the US Nuclear Regulatory Commission's Approved Packages (Volume I), all Certificates of Compliance (Volume 2), and Summary Report of NRC Approved Quality Assurance Programs (Volume 3) for Radioactive Material Packages effective December 31, 1982. The purpose of this directory is to make available a convenient source of information on packagings which have been approved by the US Nuclear Regulatory Commission. To assist in identifying packaging, an index by Model Number and corresponding Certificate of Compliance Number is included at the back of Volumes 1 and 2 of the directory. A listing by packaging types is included in the back of Volume 2. An alphabetical listing by Company name is included in the back of Volume 3 for approved QA programs. The Summary Reports include a listing of all users of each package design and approved QA programs prior to the publication date of the directory.

19811 (NUREG—0725-REV-2) Public information circular for shipments of irradiated reactor fuel. Report for 16 Jul 79-1 May 82. (Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Material Safety and Safeguards). Jun 1982. 91p. NTIS, PC A05/MF A01.

This circular has been prepared in response to numerous requests for information regarding routes used for the shipment of irradiated reactor (spent) fuel subject to regulation by the Nuclear Regulatory Commission (NRC), and to meet the requirements of Public Law 96-295. The NRC staff must approve such routes prior to their first use. Spent fuel shipment routes, primarily for road transportation, but also including one rail route, are indicated on reproductions of DOT road maps. Also included are the amounts of material shipped during the approximate three year period that safeguards regulations for spent fuel shipments have been effective. In addition, the Commission provided information in this document regarding the NRC's safety and safeguards regulations for spent fuel shipments as well as safeguards incidents regarding same.

19812 (NUREG—0923) Advance notification of shipments of nuclear waste and spent fuel: guidance. (Nuclear Regulatory Commission, Washington, DC (USA)). Jun 1982. 24p. NTIS, PC A02/MF A01.

U.S. Nuclear Regulatory Commission regulations in 10 CFR 70.5b and 73.37(f) require NRC licensees to notify the governor of a state prior to making a shipment of nuclear waste or spent fuel within or through the state. This guidance document was prepared to assist licensees in carrying out those requirements.

19813 (PNL—4555) Results of simulated abnormal heating events for full-length nuclear fuel rods. Guenther, R.J. (Pacific Northwest Lab., Richland, WA (USA)). Jan 1983. Contract AC06-76RL01830. 43p. NTIS, PC A03/MF A01. Order Number DE83007866.

Full-length nuclear fuel rods were tested in a furnace to simulate the slow heating rates postulated for commercial pressurized water reactor fuel rods exposed to an overheating event in a storage cask. Fuel rod temperatures and internal gas pressures were monitored during the test and are presented along with mensural data for cladding. Metallography of the cladding provided data on grain growth, hydriding, oxidation, cladding stresses, and the general nature of the failures.

19814 (SAND—80-2517) Analysis, scale modeling, and full-scale tests of low-level nuclear-waste-drum response to accident environments. Huerta, M.; Lamoreaux, G.H.; Romesberg, L.E.; Yoshimura, H.R.; Joseph, B.J.; May, R.A. (Sandia National Labs., Albuquerque, NM (USA); Southwest Engineering Associates, El Paso, TX (USA)). Jan 1983. Contract AC04-76DP00789. 70p. NTIS, PC A04/MF A01. Order Number DE83007587.

This report describes extensive full-scale and scale-model testing of 55-gallon drums used for shipping low-level radioactive waste materials. The tests conducted include static crush, single-can impact tests, and side impact tests of eight stacked drums. Static crush forces were measured and crush energies calculated. The tests were performed in full-, quarter-, and eighth-scale with different types of waste materials. The full-scale drums were modeled with standard food product cans. The response of the containers is reported in terms of drum deformations and lid behavior. The results of the scale model tests are correlated to the results of the full-scale drums. Two computer techniques for calculating the response of drum stacks are presented. 83 figures, 9 tables.

19815 Safety assessment of spent fuel transportation in extreme environments. Sandoval, R.P.; Weber, J.P.; Newton, G.J. (Sandia Natl Lab, Albuquerque, NM, USA). *Nuclear and Chemical Waste Management;* 3: No. 1, 5-12(1982).

A preliminary estimate of the health effects and/or consequences resulting from sabotage of spent fuel truck shipments has been made. This estimate is based upon a measured quantity (0.78/plus or minus/0.05 g) of respirable radioactive material released from a 1/4 scale event. A linear extrapolation from the 1/4 scale event to the generic full scale event has been made and an aerosolized release fraction (0.0065%) of the total heavy metal inventory of a three-PWR assembly truck cask has been calculated. It has been shown, based on the preliminary experimental source term data, that a maximum of 25 total latent cancer fatalities could occur, assuming a release in downtown New York City. This is 20 times smaller than the latent cancer fatalities predicted in the so called "Urban Study.

0510 Marketing And Economics

REFER ALSO TO CITATION(S) 19822, 19857

19816 (DOE/AL/10752—19) Review comments on Environmental Analysis Cost Reduction Proposals (WIPP-DOE-136), July 1982. Channell, J.K. (New Mexico Health and Environment Dept., Santa Fe (USA). Environmental Improvement Div.). Nov 1982. Contract AC04-78AL10752. 28p. NTIS, PC A03/MF A01. Order Number DE83007954.

The cost reduction proposals have the laudable goal of significantly reducing the total capital And operating cost connected with WIPP. Furthermore, since the proposed changes would reduce the size and operating rate of the project, they would be expected to have decreased environmental And socioeconomic impacts. However, some of these cost reduction proposals do decrease factors of safety in various components of the project or trade off one type of environmental detriment for another. The report does not contain sufficient detail to justify all of the conclusions reached; more discussion and quantitative information (including costs) is necessary in some cases. Also, there are places where the report is unclear or contradictory. Without a more detailed evaluation, EEG is unable to conclude that each of these cost reduction proposals either has a net environmental/health and safety benefit or a cost savings that justifies a net detriment. A revised Environmental Analysis (EA) should either include additional information or specifically reference backup documents where these conclusions have been justified. In addition, the EA needs to be revised to include the effect of the recently announced (11/18/82) decision by DOE to relocate the underground waste storage areas of the repository to the south.

0520 Waste Management

REFER ALSO TO CITATION(S) 19801, 19802, 19816, 19879, 19879, 19880, 19881, 19882, 19883, 19884, 19885, 19886, 19887, 19888, 19889, 19891, 20199, 20406, 21165, 21362, 21799, 22028, 22031, 22034, 22035, 22058, 22060, 22063

19817 (AD-A—115953/2) Grout formulations for nuclear waste isolation. Final report. Buck, A.D.; Mather, K. (Army Engineer Waterways Experiment Station, Vicksburg, MS (USA). Structures Lab.). Jun 1982. 35p. NTIS, PC A03/MF A01.

Some of the considerations involved in the development of hydraulic cement-based grout mixtures intended for use in the isolation of nuclear waste stored underground are longevity, impermeability, uniformity, ease of placement, and relevance to previously used systems. Work done at the Structures Laboratory of the U.S. Army Engineer Waterways Experiment Station on this subject has indicated that apparently adequate systems can be based on well known ingredients. Information on field testing and long-term testing of these grouts has confirmed this indication. The following conclusions are indicated: (a) Selection of control parameters such as flow time, time of setting, compressive strength, and permeability for a candidate grout mixture should be criteria used in the formulation of a grout mixture. (b) Once quantitative levels of such parameters have been established, the hydraulic cement-based grout system has adequate latitude in its formulation to accommodate these needs. (c) While longevity in nonaggressive environments and compatibility with host rocks is known in general for such systems, data for specific mixtures under specific conditions must be developed. A Standard Practice for Selecting Mixture Proportions for Hydraulic Cement-Based Materials Systems for Repository Sealing is presented as an Appendix.

19818 (BNL—51614) Waste-Form Development Program. Annual progress report, October 1981-September 1982. Neilson, R.M. Jr.; Colombo, P. (Brookhaven National Lab., Upton, NY (USA)). Sep 1982. Contract AC02-76CH00016. 147p. NTIS, PC A07/MF A01. Order Number DE83008475.

Low-level wastes (LLW) at nuclear facilities have traditionally been solidified using portland cement (with and without additives). Urea-formaldehyde has been used for LLW solidification while bitumen (asphalt) and thermosetting polymers will be applied to domestic wastes in the near future. Operational difficulties have been observed with each of these solidification agents. Such difficulties include incompatibility with waste constitutents inhibiting solidification, premature setting, free standing water and fires. Some specific waste types have proven difficult to solidify with one or more of the contemporary agents. Similar problems are also anticipated for the solidification of new wastes, which are generated using advanced volume reduction technologies, and with the application of additional agents which may be introduced in the near future for the solidification of LLW. In the Waste Form Development program, contemporary solidification agents are being investigated relative to their potential applications to major fuel cycle and non-fuel cycle LLW streams. The range of conditions under which these solidification agents can be satisfactorily applied to specific LLW streams is being determined. These studies are primarily directed towards defining operating parameters for both improved solidification of problem wastes such as ion exchange resins, organic liquids and oils for which prevailing processes, as currently employed, appear to be inadequate, and solidification of new LLW streams including high solids content evaporator concentrates, dry solids, and incinerator ash generated from advanced volume reduction technologies. Solidified waste forms are tested and evaluated to demonstrate compliance with waste form performance and shallow land burial (SLB) acceptance criteria and transportation requirements (both as they currently exist and as they are anticipated to be modified with time).

19819 (CONF-810606—70) Geohydrological considerations in land disposal of LLW. Yeh, G.T.; Tamura, T. (Oak Ridge National Lab., TN (USA)). 1981. Contract W-7405-ENG-26. 29p. NTIS, PC A03/MF A01. Order Number DE81024248.

From American Nuclear Society's annual meeting; Miami Beach, FL, USA (7 Jun 1981).

The geohydrological and geochemical factors that affect the transport, transfer, and transformation of the waste in the aquifer system as a result of shallow land burial practices are discussed. They include surface topography and its character, the extent of the aquifer, nearby surface water bodies, groundwater basin divide, watershed boundaries, rainfall rate, infiltration from surface water bodies, potential evapotranspiration, hydraulic conductivity, water capacity, porosity, compressibility of the matrix, dispersivity, hydrolysis, photolysis, oxidation, volatilization, biolysis, precipitation, mineral comosition, and flow dynamics. Depending on the availability of data and the detail of information desired, three levels of analyses may be undertaken. Two examples are used to illustrate these three levels of analyses using hypothetical parameters. The examples are constructed to represent the leaching from wet water body and shallow burials, respectively. The former typifies a class of problems of groundwater contamination from coal-catching basins and uranium mill tailings. The latter represents classical examples of shallow land burials such as coal solid wastes, chemical dumping and sanitary landfill.

19820 (CONF-811088—7) Incorporation of high-level nuclear waste in gel spheres. Robinson, S.M.; Arnold, W.D.; Bond, W.D.; Angelini, P.; Stinton, D.P. (Oak Ridge National Lab., TN (USA)). 1981. Contract W-7405-ENG-26. 24p. NTIS, PC A02. Order Number DE82022271.

From American Ceramic Society conference; Newport Beach, CA, USA (25 Oct 1981).

Waste sludge is incorporated in gel spheres by the method of internal gelation. Gel spheres containing up to 90 wt % waste have been produced from defense and commercial wastes. A generic cesium-bearing waste form has been developed. Pyrolytic carbon and SiC coatings reduce the leachability of all tested articles to the detection limits.

19821 (DOE/ET/41900—16) **Process description and plant design for preparing ceramic high-level waste forms.** Grantham, L.F.; McKisson, R.L.; Guon, J.; Flintoff, J.F.; McKenzie, D.E. (Rockwell International Corp., Canoga Park, CA (USA). Energy Systems Group). 25 Feb 1983. Contract AC09-79ET41900. 72p. (ESG-DOE—13397). NTIS, PC A04/MF A01. Order Number DE83007885.

The ceramics process flow diagram has been simplified and upgraded to utilize only two major processing steps - fluid-bed calcination and hot isostatic press consolidating. Full-scale fluid-bed calcination has been used at INEL to calcine high-level waste for 18 y; and a second-generation calciner, a fully remotely operated and maintained calciner that meets ALARA guidelines, started calcining high-level waste in 1982. Full-scale hot isostatic consolidation has been used by DOE and commercial enterprises to consolidate radioactive components and to encapsulate spent fuel elements for several years. With further development aimed at process integration and parametric optimization, the operating knowledge of full-scale demonstration of the key process steps should be rapidly adaptable to scale-up of the ceramic process to full plant size. Process flowsheets used to prepare ceramic and glass waste forms from defense and commercial high-level liquid waste are described. Preliminary layouts of process flow diagrams in a high-level processing canyon were prepared and used to estimate the preliminary cost of the plant to fabricate both waste forms. The estimated costs for using both options were compared for total waste management costs of SRP high-level liquid waste. Using our design, for both the ceramic and glass plant, capital and operating costs are essentially the same for both defense and commercial wastes, but total waste management costs are calculated to be significantly less for defense wastes using the ceramic option. It is concluded from this and other studies that the ceramic form may offer important advantages over glass in leach resistance, waste loading, density, and process flexibility. Preliminary economic calculations indicate that ceramics must be considered a leading candidate for the form to immobilize high-level wastes.

19822 (DOE/ET/41900—17) **Commercial high-level-waste management: options and economics. A comparative analysis of the ceramic and glass waste forms.** McKisson, R.L.; Grantham, L.F.; Guon, J.; Recht, H.L. (Rockwell International Corp., Canoga Park, CA (USA). Energy Systems Group). 25 Feb 1983. Contract AC09-79ET41900. 133p. (ESG-DOE—13391). NTIS, PC A07/MF A01. Order Number DE83006235.

Results of an estimate of the waste management costs of the commercial high-level waste from a 3000 metric ton per year reprocessing plant show that the judicious use of the ceramic waste form can save about $2 billion during a 20-year operating campaign relative to the use of the glass waste form. This assumes PWR fuel is processed and the waste is encapsulated in 0.305-m-diam canisters with ultimate emplacement in a BWIP-type horizontal-borehole repository. The estimated total cost (capital and operating) of the management in the ceramic form is $2.0 billion, and that of the glass form is $4.0 billion. Waste loading and waste form density are the driving factors in that the low-waste loading (25%) and relatively low density (3.1 g/cm^3) characteristic of the glass form require several times as many canisters to handle a given waste throughput than is needed for the ceramic waste form whose waste loading capability exceeds 60% and whose waste density is nominally 5.2 g/cm^3) characteristic of the glass form requires several times as many canisters to handle a given waste throughput than is needed for the ceramic waste form whose waste loading capability exceeds 60% and whose waste density is nominally 5.2 g/cm^3. The minimum-cost ceramic waste form has a 60 wt. % waste loading of commercial high-level waste and requires 25 years storage before emplacement in basalt with delayed backfill. Because of the process flexibility allowed by the availability of the high-waste loading of the ceramic form, the intermediate-level liquid waste stream can be mixed with the high-level liquid waste stream and economically processed and emplaced. The cost is greater by $0.3 billion than that of the best high-level liquid waste handling process sequence ($2.3 billion vs $2.0 billion), but this difference is less than the cost of the separate disposal of the intermediate-level liquid waste.

19823 (DOE/ET/41900—18) **Development of polyphase ceramics for the immobilization of high-level Defense nuclear waste.** Morgan, P.E.D.; Harker, A.B.; Clarke, D.R.; Flintoff, J.J.; Shaw, T.M. (Rockwell International Corp., Thousand Oaks, CA (USA). Science Center). 25 Feb 1983. Contract AC09-79ET41900. 108p. (ESG-DOE—13400). NTIS, PC A06/MF A01. Order Number DE83007892.

The report contains two major sections: Section I - An Improved Polyphase Ceramic for High-Level Defense Nucleation Waste reports the work conducted on titanium-silica based ceramics for immobilizing Savannah River Plant waste. Section II - Formulation and Processing of Alumina Based Ceramic Nuclear Waste Forms describes the work conducted on developing a generic alumina and alumina-silica based ceramic waste form capable of immobilizing any nuclear waste with a high aluminum content. Such wastes include the Savannah River Plant wastes, Hanford neutralized purex wastes, and Hanford N-Reactor acid wastes. The design approach and process technology in the two reports demonstrate how the generic high waste loaded ceramic form can be applied to a broad range of nuclear waste compositions. The individual sections are abstracted and indexed separately.

19824 (DOE/ET/41900—18, pp 5-46) **Improved polyphase ceramic form for high-level defense nuclear waste.** Harker, A.B.; Morgan, P.E.D.; Clarke, D.R.; Flintoff, J.J.; Shaw, T.M. 25 Feb 1983. NTIS, PC A06/MF A01.

In Development of polyphase ceramics for the immobilization of high-level Defense nuclear waste.

An improved ceramic nuclear waste form and fabrication process have been developed using simulated Savannah River Plant defense high-level waste compositions. The waste form provides flexibility with respect to processing conditions while exhibiting superior resistance to ground water leaching than other currently proposed forms. The ceramic, consolidated by hot-isostatic pressing at 1040°C and 10,000 psi, is composed of six major phases, nepheline, zirconolite, a murataite-type cubic phase, magnetite-type spinel, a magnetoplumbite solid solution, and perovskite. The waste form provides multiple crystal lattice sites for the waste elements, minimizes amorphous intergranular material, and can accommodate waste loadings in excess of 60 wt %. The fabrication of the ceramic can be accomplished with existing manufacturing technology and eliminates the effects of radionuclide volatilization and off-gas induced corrosion experienced with the molten processes for vitreous form production.

19825 (DOE/ET/41900—18, pp 47-107) **Formulation and processing of alumina based ceramic nuclear waste forms.** Harker, A.B.; Morgan, P.E.D.; Clarke, D.R.; Flintoff, J.J.; Jantzen, C.M. 25 Feb 1983. NTIS, PC A06/MF A01.

In Development of polyphase ceramics for the immobilization of high-level Defense nuclear waste.

A class of dense, high-alumina ceramics has been developed for the immobilization of Savannah River Plant defense nuclear waste. The ceramics, fabricated by hot isostatic pressing or reactive hot pressing, normally consist of four compatible crystalline phases - magnetoplumbite, spinel, uraninite, and corundum. A fifth compatible phase, nepheline, can be designed into the assemblage when high sodium levels are present in the waste. All radionuclides are incorporated into the magnetoplumbite and uraninite phases, with the nonradiophases providing microstructural isolation of the individual radiophase grains. The chemical formulation of the ceramic waste form and the processing requirements is discussed.

19826 (DOE/LLW—16T) **Process for locating shallow land-burial sites for low-level radioactive waste. National Low-Level Radioactive Waste Management program.** (Oak Ridge National Lab., TN (USA); EG and G Idaho, Inc., Idaho Falls (USA)). Mar 1983. Contract AC07-76ID01570. 73p. NTIS, PC A04/MF A01. Order Number DE83008173.

The report describes the development of a screening process for siting low-level radioactive waste disposal facilities, and a test application of that process in Tennessee. The site-selection criteria were developed based on the Nuclear Regulatory Commission's disposal regulation, 10 CFR 61. Data on the geologic, hydrologic, and geographic systems in Tennessee were analyzed to select a suitable area for low-level waste disposal. Selection of the best candidate area was based on: remoteness from population centers, availability of major transportation systems, low risk of flooding, erosion resistance, lack of geologic hazards, and other factors.

19827 **(DOE/NE—0025/1) Uranium Mill Tailings Remedial Action Program. Annual status report.** (USDOE Assistant Secretary for Nuclear Energy, Washington, DC. Office of Terminal Waste Disposal and Remedial Action). Dec 1982. 28p. NTIS, PC A03/MF A01. Order Number DE83008142.

Progress made during FY 1982, present status, and plans for FY 1983 are described for the following programs: radiological surveys and inclusion of vicinity properties; establishment of cooperative agreements; promulgation of standards for remedial action; acquisition of lands and materials; reprocessing of residual radioactive materials; National Environmental Policy Act (NEPA) documentation; program planning; technology development; remedial action; public participation; other federal agency activities; state and Indian tribe activities; and status of designated sites. Program funding is given.

19828 **(DOE/TIC—3388) Waste isolation: a bibliography.** McLaren, L.H. (ed.). (Department of Energy, Oak Ridge, TN (USA). Technical Information Center). Dec 1982. 296p. NTIS, PC A13/MF A01. Order Number DE82012273.

This bibliography contains information on waste isolation included in the Department of Energy's Energy Data Base from January 1981 through November 1982. The abstracts are grouped by subject category as shown in the table of contents. Entries in the subject index also facilitate access by subject, e.g., Radioactive Waste Disposal/Salt Deposits. Within each category the arrangement is by report number for reports, followed by nonreports in reverse chronological order. These citations are to research reports, journal articles, books, patents, theses, and conference papers from worldwide sources. Five indexes, each preceded by a brief description, are provided: Corporate Author, Personal Author, Subject, Contract Number, and Report Number.

19829 **(DPST—78-296) Pathways for dose to man from buried solid waste.** (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.). 13 Jun 1978. Contract AC09-76SR00001. 26p. NTIS (US Sales Only). Order Number DE83007903.

A conceptual model has been developed to estimate the rate and extent of nuclide transport from buried solid waste through the environment to man and subsequent dose to man. This memorandum describes in detail the pathways of the model. The general form for the transfer coefficient for each pathway is also described.

19830 **(GRS—49) Sensitivity study of the thermomechanical reaction of rock salt to radioactive waste storage.** Mohiuddin, G.M. (Gesellschaft fuer Reaktorsicherheit m.b.H. (GRS), Koeln (Germany, F.R.)). Jul 1982. 34p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750178.

Calculations performed in this study have shown that the STEALTH code is suitable for the prediction of temperature and stress field in a salt dome where radioactive wastes are stored. The STEALTH version used here has been extended by Wahi et al. (Wa et al. 78) and includes the creeping model developed by Maxwell et al. (Ma et al. 78), thus allowing to determine the closure of the caverns too. GRS (Sa, Ba 79) has successfully used this STEALTH version for post-calculations of the temperature field experiment. It has been found that the calculated closure (e.g. the closure of borehole in the temperature field experiment no. 3 in Asse) results almost solely from the creep deformation. As creep deformation depends very much on the temperature and the stress, a better knowledge of the creep mechanism in salt as well as the formulation of a suitable creep law are the prerequisites for a better agreement between calculations and experiments.

19831 **(HEDL-SA—2615) FFTF radioactive solid waste handling and transport.** Thomson, J.D. (Hanford Engineering Development Lab., Richland, WA (USA)). 14 Dec 1981. Contract AC06-76FF02170. 34p. (CONF-820303—43). NTIS, PC A03. Order Number DE82016161.

From Waste management conference; Tucson, AZ, USA (8 Mar 1982).

A description of the solid waste disposal process, and the casks and equipment used for handling and transport is provided.

19832 **(JAERI-M—8824) Radiological safety studies on ground disposal of radioactive wastes. Distribution and migration of radionuclides in the aerated zone.** Takebe, S.; Yamamoto, T.; Wadachi, Y. (Japan Atomic Energy Research Inst., Tokyo. Radioisotope School). Apr 1980. 14p. (MIXED). NTIS (US Sales Only), PC A02/MF A01.

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The behavior of radionuclides in an aerated zone, and migration and distribution of Cs-137, Co-60 and Sr-90-Y-90 in an aerated sand layer were examined with a medium scale sand layer model apparatus. The distribution ratio of each radionuclide in vertical direction of the sand layer decreases exponentially, going to further depths a large part of radionuclide is adsorbed in the upper region, near to the point of downward flow. Two dimensional distribution of each radionuclide in the sand layer is as follows. Migration of Cs-137 is small in both vertical and horizontal directions of the sand layer. That of Co-60 is large in both vertical and horizontal directions. That of Sr-90-Y-90 is small in horizontal direction and large in vertical direction, and its distribution is similar to the case of Cs-137. In conclusion, the differences in migration and distribution between the radionuclides depend on their chemical forms, i.e., ionic or nonionic.

19833 **(LA-UR—83-307) Measurement of radioactive contaminated wastes.** Caldwell, J.T.; Close, D.A.; Crane, T.W. (Los Alamos National Lab., NM (USA); EG and G, Inc., Goleta, CA (USA)). 1983. Contract W-7405-ENG-36. 13p. (CONF-830205—11). NTIS, PC A02/MF A01. Order Number DE83007541.

From Waste management conference; Tucson, AZ, USA (27 Feb 1983).

At Los Alamos, a comprehensive program is underway for the development of sensitive, practical, nondestructive assay techniques for the quantification of low-level transuranics in bulk solid wastes. The program encompasses a broad range of techniques, including sophisticated active and passive gamma-ray spectroscopy, passive neutron detection systems, pulsed portable neutron generator interrogation systems, and electron accelerator-based techniques. The techniques can be used with either low-level or high-level beta-gamma wastes in either low-density or high-density matrices. The techniques are quite sensitive ($<$ 10 nCi/g detection) and, in many cases, isotopic specific. Waste packages range in size from small cardboard boxes to large metal or wooden crates. Considerable effort is being expended on waste matrix identification to improve assay accuracy.

19834 **(LBL—13600, pp 5-8) Geologic systems as analogs for long-term radioactive waste isolation: intrusive-rock/country-rock contact zones.** Wollenberg, H.; Brookins, D.; Cohen, L.; Flexser, S.; Abashian, M.; Shea, M. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1981.

Selected natural occurrences of minerals and rocks containing radioelements and fission-product elements can be considered as analogs of sites for geologic disposal of nuclear waste. They can be studied to ascertain how radionuclides and their daughter elements might migrate from sites of origin in response to long-term natural processes: heating due to an igneous intrusion; circulation through hydrothermal systems; diffusion through the rock matrix; and weathering and erosion. Initial investigations have covered two quite different potential geologic analogs of nuclear waste isolation: (1) migration around the Bryan-Eldora stock in Colorado; and (2) migration away from the vein deposit of radioactive minerals at Marysvale, Utah. The Eldora and Marysvale studies test the concept of waste disposal in basement rocks under conditions more extreme than those proposed for nuclear waste disposal; both studies strongly suggest the feasibility of storage in basement rocks.

19835 (LBL—13600, pp 8-11) **Iron-nickel alloys as canister material for radioactive waste disposal in underground repositories.** Apps, J.A. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1981.

Canisters containing high-level radioactive waste must retain their integrity in an underground waste repository for at least one thousand years after burial (Nuclear Regulatory Commission, 1981). Since no direct means of verifying canister integrity is plausible over such a long period, indirect methods must be chosen. A persuasive approach is to examine the natural environment and find a suitable material which is thermodynamically compatible with the host rock under the environmental conditions with the host rock under the environmental conditions expected in a waste repository. Several candidates have been proposed, among them being iron-nickel alloys that are known to occur naturally in altered ultramafic rocks. The following review of stability relations among iron-nickel alloys below 350°C is the initial phase of a more detailed evaluation of these alloys as suitable canister materials.

19836 (LBL—13600, pp 11-14) **Coupled hydrologic-thermomechanical experiments for radioactive waste isolation.** Korbin, G.; Wollenberg, H.; Strisower, B.; Wilson, C.; Chan, T. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1981.

Plans for an underground research facility have been formulated, incorporating techniques to assess the hydrologic and thermomechanical response of a rock mass to the introduction and long-term isolation of radioactive waste and to assess the effects of excavation on the hydrologic integrity of a repository and its subsequent backfill, plugging, and sealing. In this report we summarize the conceptual design of the hydrologic-thermomechanical experiment to be conducted in the research facility.

19837 (LBL—13600, pp 15-17) **Thermal impact of waste emplacement and surface cooling associated with geologic disposal of nuclear waste.** Wang, J.S.Y.; Mangold, D.C.; Spencer, R.K.; Tsang, C.F. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1981.

The age of nuclear waste - the length of time between its removal from the reactor cores and its emplacement in a repository - is a significant factor in determining the thermal loading of a repository. The surface cooling period as well as the density and sequence of waste emplacement affects both the near-field repository structure and the far-field geologic environment. To investigate these issues, a comprehensive review was made of the available literature pertaining to thermal effects and thermal properties of mined geologic repositories. This included a careful evaluation of the effects of different surface cooling periods of the wastes, which is important for understanding the optimal thermal loading of a repository. The results led to a clearer understanding of the importance of surface cooling in evaluating the overall thermal effects of a radioactive waste repository. The principal findings from these investigations are summarized in this paper.

19838 (LBL—13600, pp 18-21) **Basis for a tentative thermohydrologic criterion for emplacement density in a nuclear waste repository.** Wang, J.S.Y.; Mangold, D.C.; Tsang, C.F. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1981.

Thermal loading is a principal consideration in the design and evaluation of a repository for geologic disposal of nuclear wastes. Existing criteria are based on thermomechanical stability considerations for the waste package and the repository structural components as well on the allowable surface uplift due to thermal expansion of the surrounding rock medium. The vertical buoyancy flow from the repository to the surface has not been considered as a boundary criterion in the determination of repository loading densities. In this synopsis we discuss a generic thermohydrologic criterion to directly address the issue of thermal impacts on groundwater movement and radionuclide transport.

19839 (LBL—13600, pp 31-34) **Development of a coupled thermal-hydraulic-mechanical finite-element model for saturated fractured porous media.** Noorishad, J.; Wang, J.S.Y.; Tsang, C.F.; Witherspoon, P.A. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1981.

Investigations over the past decade at the University of California, Berkeley, and Lawrence Berkeley Laboratory have led to the development of numerical models capable of analyzing the coupled hydraulic-mechanical behavior of rock masses. Employing the most recent results it is now possible to investigate the coupled hydromechanical response of saturated fractured porous rocks subject to fluid-flow or structural-load boundary conditions. Recent concerns about the safe disposal of radioactive wastes in geologic systems calls for simultaneous consideration of hydromechanical, hydrothermal, and thermomechanical effects in the designs of selected repositories. In view of this fact, and as a natural outgrowth of earlier studies, work has been underway to develop an approach to the thermal-hydraulic-mechanical behavior of fractured rocks. The essential features of this coupled finite-element method are presented in this paper.

19840 (LBL—13600, pp 35-38) **Assessment and evaluation of engineering options at a low-level radioactive waste storage site.** Kanehiro, B.Y.; Guvanasen, V. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1981.

This report summarizes work done at the Weldon Spring radioactive waste storage site. The primary purpose of this work has been to seek solutions to hydrologic and geotechnical problems associated with existing disposal sites and to evaluate the efficiency of engineering options that have been proposed to improve the integrity of such sites. The Weldon Spring site is generally like other low-level nuclear waste sites, except that the wastes are primarily in the form of residues and contaminated rubble from the processing of uranium and thorium ores rather than industrial isotopes or mill tailings.

19841 (LBL—13600, pp 38-41) **Verification and improvement of a predictive model for radionuclide migration.** Miller, C.W.; Benson, L.V.; Carnahan, C.L. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1981.

Prediction of the rates of migration of contaminant chemical species in groundwater flowing through toxic waste repositories is essential to the assessment of a repository's capability of meeting standards for release rates. A large number of chemical transport models, of varying degrees of complexity, have been devised for the purpose of providing this predictive capability. In general, the transport of dissolved chemical species through a water-saturated porous medium is influenced by convection, diffusion/dispersion, sorption, formation of complexes in the aqueous phase, and chemical precipitation. The reliability of predictions made with the models which omit certain of these processes is difficult to assess. A numerical model, CHEMTRN, has been developed to determine which chemical processes govern radionuclide migration. CHEMTRN builds on a model called MCCTM developed previously by Lichtner and Benson.

19842 (LBL—13600, pp 42-44) **Uranium disequilibrium measurements on groundwaters.** Michel, M.C.; Keyes, W.R. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1981.

Among its other uses, the naturally occurring disequilibrium between ^{234}U and ^{238}U in most groundwaters has been suggested as a method of determining the age of such waters. This method is applicable to ages within the range of the half-life of ^{234}U (about 250,000 yr) and is therefore of interest in assessing sites for nuclear waste repositories. As with other suggested methods for groundwater dating, interpretation of the data raises issues that relate to the complexity of the system as well as to our imperfect knowledge of the mechanisms involved in the basic geochemical constraints on the system. It has been the purpose of our work to add to the understanding of the mechanisms by which ^{234}U is enriched or depleted in groundwaters and to develop the necessary analytical techniques for studying these processes. Special emphasis has been given to techniques that will be applicable to likely nuclear waste repository sites - i.e., where water flows are low, rocks are impermeable, and recovery of samples is difficult.

19843 (LBL—13600, pp 45-47) **Uranium (VI) retardaton mechanisms.** Silva, R.J.; Yee, A.W. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1981.

The solubility of hexavalent uranium, UO_2^{2+}, was measured as a function of pH (5 to 10), NaCl supporting electrolyte concentration (0.01 M and 0.1 M NaCl), and equilibration time in batch experiments. Dilute hydrochloric acid solutions of UO_2^{2+} were titrated to the various pH values with NaOH. The solid which precipitated from the supersaturated solution was presumably uranyl hydroxide.

19844 (LBL—13600, pp 48-49) **Sorptive diffusion in clay gels.** Apps, J.A.; Radke, C.J. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1981.

Additional protection for the underground storage of high-level nuclear wastes can be provided by an engineered barrier or backfill material. If properly designed, such a barrier can significantly retard the migration of toxic ions even after failure of the waste canister. The backfill material should be inexpensive, relatively impermeable, thermally stable, highly sorptive to toxic ions, compatible with the host rock, easily applied, and, if possible, a fissure sealant. One material that apparently meets most of these qualifications is a swelling clay known as smectite or montmorillonite. The purpose of this research is to investigate experimentally the migration of representative nuclides in swollen clay gels and to formulate a quantitative transport model allowing reliable design of such an engineered barrier.

19845 (LBL—13600, pp 50-52) **Investigation of silicate surface chemistry and reaction mechanisms associated with mass transport in geologic media.** White, A.F.; Perry, D.L. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1981.

The concentration and rate of transport of radionuclides through geologic media can be strongly influenced by the extent of sorption on aquifer surfaces. Over time intervals relevant to such transport processes, rock and mineral surfaces cannot be considered as inert, unreactive substrates but rather as groundwater/solidphase interfaces which are commonly in a state of natural or artificially induced disequilibrium. The goal of the present research is to define experimentally the type of water/rock interactions that will influence surface chemistry and hence sorption characteristics and capacities of natural aquifers. As wide a range of silicate minerals as possible was selected for study to represent rock-forming minerals in basalt, tuff, and granite. The minerals include K-feldspar, plagioclase feldspar, olivine, hornblende, biotite, and volcanic glass.

19846 (LBL—13600, pp 53-55) **Research on nuclear waste isolation at Stripa: an overview.** Witherspoon, P.A.; Cook, N.G.W.; Gale, J.E.; Wilson, C.R. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1981.

A principal attribute of deep geologic disposal of radioactive waste is the high degree of physical protection it provides against human intrusion and natural events. However, even in a geologically suitable area, transport to the biosphere may occur through groundwater. There are, therefore, a number of attributes that any site should have: low permeability, low interconnected porosity, low hydraulic gradient, and high sorptive capacity. Heat generated by the waste introduces the additional requirements of chemical and mechanical stability. To assess the ability of a rock mass to isolate waste, new experimental techniques and analytical procedures must be developed to improve understanding of rock mass behavior and transport in slowly moving groundwaters. Over the past several years, thermomechanical, hydrological, and geochemical investigations have been conducted by Lawrence Berkeley Laboratory in a fractured quartz monzonite rock at a depth of some 340 m in a worked-out iron ore mine at Stripa in Sweden. This work is part of a Swedish-American cooperative program.

19847 (LBL—13600, pp 56-58) **Radiogeologic assessment for nuclear waste isolation: studies of the Stripa pluton.** Wollenberg, H.; Flexser, S.; Andersson, L. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

To properly characterize candidate sites for radioactive waste isolation, it will be necessary to obtain a good understanding of their radiogeologic settings. The distribution and abundance of the naturally occurring radioelements - ^{238}U, ^{232}Th, their daughters, and ^{40}K, both in the rock mass encompassing the repository and in the neighboring rocks - constitute the baseline upon which the effects of the radioactive waste are superimposed. The distribution of these radioelements is also a good indicator of the geochemical homogeneity of the rock mass. At the Stripa experimental facility in an inactive iron mine in central Sweden, radiogeologic studies included gamma-spectrometric surveys, on the surface and underground, of the U, Th, and K contents of the quartz monzonite pluton encompassing the experiments, the high-grade metamorphic rocks surrounding the pluton, and the neighboring larger granitic plutons. The gamma-spectral surveys were calibrated by laboratory analyses of hand specimens and drill cores, permitting calculation of radioelement concentrations from field counting rates.

19848 (LBL—13600, pp 58-61) **Thermomechanical properties of Stripa granite.** Myer, L. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

The Stripa material properties testing program was initiated to study, by laboratory testing, the thermomechanical behavior of the Stripa rock mass and to provide material properties for input into numerical programs for simulation of the in situ heater experiments at Stripa. The portion of the program dealing with measurement of elastic moduli and coefficients of thermal expansion of dry, intact samples of Stripa granite was completed in fiscal year 1980. A summary of the most significant findings resulting from tests on six samples are presented in this report.

19849 (LBL—13600, pp 61-64) **Analysis of temperature data from the full-scale heater experiments at Stripa.** Javandel, I.; Witherspoon, P.A. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

In order to examine the thermomechanical behavior of deeply fractured crystalline rock when it is used for the isolation of high-level nuclear waste, a series of experiments was conducted in deep granitic rock at Stripa, Sweden, in a site adjacent to an abandoned iron mine. Among these experiments were two full-scale heating experiments carried out at a depth of approximately 340 m. These experiments were designed to study the near-field effects of heating the rock at two different thermal power levels, with electrical heaters substituting for nuclear waste canisters. Later, one of these experiments was supplemented by eight peripheral heaters to account for the interaction of surrounding waste canisters.

19850 (LBL—13600, pp 65-68) **Rod-type extensometers in long-term elevated temperature service.** DuBois, A.O.; Nelson, P.H.; Hood, M.; Binnall, E. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

At Stripa, Sweden, 35 rod-type extensometers were used to measure displacements within the granite rock mass surrounding electrical heaters emplaced in the floor of an underground entry. One of the objectives of these thermomechanical tests was to evaluate the performance of currently available rock instrumentation when subjected to long-term service at elevated temperatures.

19851 (LBL—13600, pp 69-71) **Determination of the state of stress at the Stripa mine, Sweden.** Doe, T. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

The goals of the Stripa stress measurement program are twofold: (1) to provide in situ stress data for the analysis of the thermomechanical and hydrologic measurments at the site and (2) to compare the results of hydraulic fracturing with a variety of overcoring techniques at a common site.

19852 (LBL—13600, pp 163-165) **Chemistry of nuclear waste substances in aqueous solutions.** Phillips, S.L.; Igbene, A. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1981.

Underground storage of nuclear wastes requires prediction of the likelihood of leaching from containers and subsequent migration of waste nuclides into natural waters. Although a great deal of information is needed, this work is limited to thermodynamic and kinetic data on metal-ion species in aqueous media. Such data are used in computer codes, Eh-ph diagrams, and other calculations of metal species at high temperatures.

19853 (LBL—14086) **Nuclear-waste isolation in the unsaturated zone of arid regions.** Wollenberg, H.A.; Wang, J.S.Y.; Korbin, G. (Lawrence Berkeley Lab., CA (USA)). May 1982. Contract AC03-76SF00098. 17p. (CONF-8205157—1). NTIS (US Sales Only). Order Number DE83006956.

From American Geophysical Union spring meeting; Philadelphia, PA, USA (31 May 1982).

The vadose zone in arid regions is considered as a possible environment for geologic isolation of nuclear waste. There are several topographic and lithologic combinations in the vadose zone of arid regions that may lend themselves to waste isolation considerations. In some cases, topographic highs such as mesas and interbasin ranges - comprised of several rock types, may contain essentially dry or partially saturated conditions favorable for isolation. The adjacent basins, especially in the far western and southwestern US, may have no surface or subsurface hydrologic connections with systems ultimately leading to the ocean. Some rock types may have the favorable characteristics of very low permeability and contain appropriate minerals for the strong chemical retardation of radionuclides. Environments exhibiting these hydrologic and geochemical attributes are the areas underlain by tuffaceous rocks, relatively common in the Basin and Range geomorphic province. Adjacent valley areas, where tuffaceous debris makes up a significant component of valley fill alluvium, may also contain thick zones of unsaturated material, and as such also lend themselves to strong consideration as respository environments. This paper summarizes the aspects of nuclear waste isolation in unsaturated regimes in alluvial-filled valleys and tuffaceous rocks of the Basin and Range province.

19854 (LBL—15029) **Selected hydrologic and geochemical issues in site characterization for nuclear waste disposal: flood basalts at the Hanford Reservation.** Carnahan, C.L.; Delany, J.M.; Long, J.C.S.; Silva, R.J.; Watkins, D.J.; White, A.F.; Wilson, C.R. (Lawrence Berkeley Lab., CA (USA)). Sep 1982. Contract AC03-76SF00098. 179p. NTIS, PC A09/MF A01. Order Number DE83007204.

Four issues are considered that must be addressed by a site characterization program designed to evaluate the suitability of the flood basalts of the Pasco Basin in central Washington as a site for the construction of a repository for the disposal of high-level nuclear waste. The four issues are (1) identification of hydrostratigraphic units within a sequence of flood basalts, (2) mechanisms and points of groundwater recharge and discharge, (3) solubility of radionuclides, and (4) phase transformation of fracture filling materials. Each issue is discussed in terms of its significance to waste isolation. Available approaches for resolving the issues are presented and their limitations identified. Where appropriate, research programs for overcoming these limitations are indicated.

19855 (MLM—3045) **Pelletized Waste Form Demonstration Program. Volume II. Description and performance.** Lewis, E.L. (Monsanto Research Corp., Miamisburg, OH (USA). Mound). 28 Feb 1983. Contract AC04-76DP00053. 22p. NTIS, PC A02/MF A01. Order Number DE83008172.

This report (Volume II) presents the design and performance characteristics of the Mound Pelletization Process. Detailed descriptions of both the process and equipment are given as well as the performance characteristics of the Demonstration Waste Pelletization System. Volume I, which was published as a separate document (MLM-MU-82-70-0001), is an engineering reference manual for the Mound Waste Pelletization Process.

19856 (NUREG/CR—2700) **Parameters for characterizing sites for disposal of low-level radioactive waste. Technical report.** Lutton, R.J.; Malone, P.G.; Meade, R.B.; Patrick, D.M. (Army Engineer Waterways Experiment Station, Vicksburg, MS (USA)). May 1982. 77p. NTIS, PC A05/MF A01.

Sixty-seven site parameters and parameter groups are identified as important characteristics of sites for disposal of low-level radioactive waste and require detailed evaluation. Several of the most important parameters are needed for hydrological analysis while others are needed for facility design, construction, and operation. Still others are needed for baseline and detection stages of monitoring. Much of this report, Appendices A through G, is directed to explaining the importances of parameters and to establishing site-specific limitations.

19857 (ONI—3) **Projected costs for mined geologic repositories for dispoal of commercial nuclear wastes.** Waddell, J.D.; Dippold, D.G.; McSweeney, T.I. (Battelle Memorial Inst., Columbus, OH (USA). Office of National Waste Terminal Storage Integration). Dec 1982. Contract AC06-76RL01830. 57p. NTIS, PC A04/MF A01. Order Number DE83004872.

This documen reports cost estimates for: (1) the exploration and development activities preceding the final design of terminal isolation facilities for disposal of commercial high-level waste; and (2) the design, construction, operation, and decommissioning of such facilities. Exploration and evelopment costs also include a separate cost category for related programs such as subseabed research, activities of the Transportation Technology Center, and waste disposal impact mitigation activities.

19858 (ONWI—9(82-3)) **Technical progress report for the quarter, 1 April-30 June 1982.** (Battelle Memorial Inst., Columbus, OH (USA). Office of Nuclear Waste Isolation). 1982. Contract AC06-76RL01830. 202p. NTIS, PC A10/MF A01. Order Number DE83007304.

This report describes the technical accomplishments during the period from April through June 1982 on the commercial nuclear waste management programs under the direction of the Office of Nuclear Waste Isolation (ONWI). This office has lead responsibilities in the National Waste Terminal Storage program structure for oversight and for development of the general technology, and for geologic exploration of non-DOE land. A project management group, ONWI directs and evaluates studies, research, and development performed by subcontractors on repository sites and designs. The scope of ONWI activities includes providing the technology and facilities for the terminal isolation of these wastes by disposal in mined repositories deep underground in stable geologic formations. The ONWI program is organized into eight tasks: Systems; Waste Package; Site; Repository; Regulatory and Institutional; Test Facilities and Excavations; Land Acquisition; and Program Management. The accomplishments in each of these tasks are reported.

19859 (ONWI—102-Vol.1) **Area environmental characterization report of the Dalhart and Palo Duro basins in the Texas Panhandle. Volume I. Dalhart Basin.** (NUS Corp., Gaithersburg, MD (USA)). Sep 1982. Contract AC06-76RL01830. 193p. NTIS, PC A09/MF A01. Order Number DE83007219.

This area report describes the environmental characteristics of the Dalhart and Palo Duro basins of the Texas Panhandle portion of the Permian basin. Both basins are rather sparsely populated, and the overall population is decreasing. The economic base is centered on agribusiness and manufacturing. Most of the potentially conflicting land uses in both basins (i.e., parks, historic sites) occupy small land areas, with the exception of a national grassland in the Dalhart and military air training routes in both basins. Ground transportation in the Dalhart basin is adequate, and it is well developed in the Palo Duro basin. In both basins irrigation constitutes the principal water use, and groundwater is the principal source. However, the dominant aquifer, the Ogallala, is being depleted. Both basins consist primarily of grasslands, rangelands, and agricultural areas. No critical terrestrial or aquatic habitats have been identified in the basins, though several endangered, threatened, or rare terrestrial species occur in or near the basins. Aquatic resources in both basins are limited because of the intermittent availability of water and the high salt content of some water bodies. Playa lakes are common, though usually seasonal or rain dependent. The climate of the area is semiarid, with low humidity, relatively high wind speeds, and highly variable prcipitation. Restrictive dispersion conditions are infrequent. National ambient secondary air quality standards for particulates are being exceeded in the area, largely because of fugitive dust, although there are some particulate point sources.

19860 (ONWI—102-Vol.2) Area environmental characterization report of the Dalhart and Palo Duro basins in the Texas Panhandle. Volume II. Palo Duro basin. (NUS Corp., Gaithersburg, MD (USA)). Sep 1982. Contract AC06-76RL01830. 303p. NTIS, PC A14/MF A01. Order Number DE83007215.

This area report describes the environmental characteristics of the Dalhart and Palo Duro basins of the Texas Panhandle portion of the Permian basin. Both basins are rather sparsely populated, and the overall population is decreasing. The economic base is centered on agribusiness and manufacturing. Most of the potentially conflicting land uses in both basins (i.e., parks, historic sites) occupy small land areas, with the exception of a national grassland in the Dalhart and military air training routes in both basins. Ground transportation in the Dalhart basin is adequate, and it is well developed in the Palo Duro basin. In both basins irrigation constitutes the principal water use, and groundwater is the principal source. However, the dominant aquifer, the Ogallala, is being depleted. Both basins consist primarily of grasslands, rangelands, and agricultural areas. No critical terrestrial or aquatic habitats have been identified in the basins, though several endangered, threatened, or rare terrestrial species occur in or near the basins. Aquatic resources in both basins are limited because of the intermittent availability of water and the high salt content of some water bodies. Playa lakes are common, though usually seasonal or rain dependent. The climate of the area is semiarid, with low humidity, relatively high wind speeds, and high variable precipitation. Restrictive dispersion conditions are infrequent. National ambient secondary air quality standards for particulates are being exceeded in the area, largely because of fugitive dust, although there are some particulate point sources.

19861 (PB—82-227042) Two hypothetical problems in radioactive waste management: a comparison of cost/benefit analysis and decision analysis. Watson, S.R.; Hayward, G.M. (Cambridge Univ. (UK). Dept. of Engineering). Mar 1982. 35p. NTIS, PC A03/MF A01.

In particular the presentation has argued that Decision Analysis (DA) has considerable advantages over Cost Benefit Analysis (CBA), a view which may not be acceptable to practitioners of CBA. The criticism may be levelled that the authors have misinterpreted CBA in order to make their point. As mentioned above, however, the authors have taken a particular view of CBA in order to emphasize the distinction between an approach based in economics, and one based in psychology and management studies. Moreover many formal analyses of public policy today contain elements from both approaches, so that the distinction between CBA and DA may not be as clear-cut as indicated. There is however a basic difference of approach which it is hoped has been spelt out in the studies of chapters 2 and 3; the essential difference is between a device which seeks to determine what is socially best, in an objective manner, and a device to assist a group of decision-makers in clarifying their understanding of a complex decision problem.

19862 (PB—83-104042) Results of hydrologic tests and water-chemistry analyses, wells H-6A, H-6B, and H-6C, at the proposed Waste Isolation Pilot Plant site, southeastern New Mexico. Water resources investigations (final). Dennehy, K.F. (Geological Survey, Albuquerque, NM (USA). Water Resources Div.). Jan 1982. 79p. NTIS, PC A05/MF A01.

Hydrologic testing was conducted at wells H-6A, H-6B, and H-6C in the northwestern part of the proposed Waste Isolation Pilot Plant site in southeastern New Mexico to define hydraulic properties of three water-bearing zones. The zones tested were the Magenta and Culebra Dolomite Members of the Rustler Formation and the Rustler Formation-Salado Formation contact. The Magenta Dolomite and the Rustler-Salado contact yield water to wells at rates less than 0.5 gallon per minute as determined from shut-in and slug tests. A transmissivity value for the Culebra Dolomite Member was obtained by conducting conventional pumping and recovery tests in well H-6B; this well was pumped at a rate of approximately 11 gallons per minute. Water samples from the Magenta Dolomite Member of the Rustler Formation had a dissolved-solids concentration of 5,760 milligrams per liter. The major chemical constituents of water samples from this zone were sulfate, sodium, and chloride. Water samples from the Culebra Dolomite Member of the Rustler Formation had dissolved-solids concentration of 52,600 milligrams per liter, and samples from the Rustler Formation-Salado Formation contact had 316,000 milligrams per liter; chloride and sodium were the major constituents in the water samples. Radium-226, a naturally occurring radioactive element, was present in samples from all three zones.

19863 (RFP—3492) Actinide removal from waste solutions by ferrite treatment. Boyd, T.E.; Kochen, R.L. (Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant). 1983. Contract AC04-76DP03533. 7p. (CONF-830205—12). NTIS, PC A02/MF A01. Order Number DE83007536.

From Waste management conference; Tucson, AZ, USA (27 Feb 1983).

In laboratory tests, ferrite treatment was effective in removing actinides from Rocky Flats process waste. Plutonium concentrations were consistently lowered from over 10^{-4} g/l to the 10^{-7} to 10^{-8} g/l range. At the same time, 3.2 to 3.6 g/l solids were produced as compared to 15.7 g/1 observed over a recent 16-month period for waste treatment by flocculant precipitation. Whereas ferrite treatment required only one treatment step, at least two treatment steps are needed for flocculant precipitation to achieve the same results. Greater loadings of ferrite in a cement matrix were obtained so that very significant weight and volume reduction in immobilized solid TRU waste were observed. In addition to its effectiveness in actinide removal, ferrite waste treatment has shown considerable versatility, which would facilitate its application to a variety of waste media. There are two treatment to be used in different chemical environments. Whereas the in situ method is affected by the presence of other metal ions, the preformed ferrite addition technique is much less sensitive to the chemistry of the waste medium. Because of their strongly magnetic nature, ferrite solids can be separated magnetically in addition to techniques such as filtration and centrifugation.

19864 (RHO-BW-SR—82-2-2Q-P) Basalt Waste Isolation Project drilling and testing. Quarterly report, April 1, 1982-June 30, 1982. (Rockwell International Corp., Richland, WA (USA). Energy Systems Group). 1 Jul 1982. Contract AC06-77RL01030. 45p. NTIS, PC A03/MF A01. Order Number DE83007947.

This document is a summary of drilling and testing results during the second calendar quarter (April through June 1982). The principal work during this period included the drilling and/or testing of boreholes RRL-2, DC-16A, DC-7/8, DC-15, DH-24, DH-25, McGee and BH-17. Specific highlights of this work are summarized.

19865 (RHO-BW-SR—82-2-3Q-P) Basalt Waste Isolation Project drilling and testing. Quarterly report, July 1, 1982-September 30, 1982. (Rockwell International Corp., Richland, WA (USA). Energy Systems Group). 1 Oct 1982. Contract AC06-77RL01030. 51p. NTIS, PC A04/MF A01. Order Number DE83008195.

This document is a summary of drilling and testing results during the third calendar quarter (July through September 1982). The principal work during this period included the drilling and/or testing of boreholes RRL-2, RRL-6, RRL-14, DC-3, DC-16A, DC-16C, and the McGee Well. Specific highlights of this work are summarized.

19866 (SAND—79-0269) Basic data report for drillhole AEC 8 (Waste Isolation Pilot Plant - WIPP). (Sandia National Labs., Albuquerque, NM (USA); D'Appolonia Consulting Engineers, Albuquerque, NM (USA)). Jan 1983. Contract AC04-76DP00789. 154p. NTIS, PC A08/MF A01. Order Number DE83008481.

AEC 8 was originally drilled in 1974 to a depth of 3028 ft by Oak Ridge National Laboratory as part of the initial investigations of a site for radioactive waste disposal. In 1976, Sandia National Laboratories deepened the borehole from the top of the Castile Formation into the Bell Canyon Formation to test the hydraulic properties of the Bell Canyon. The borehole encountered in descending order Holocene sands (20 ft), Mescalero caliche (6 ft), Santa Rosa Sandstone (143 ft), Dewey Lake Redbeds (491 ft), Rustler Formation (322 ft), Salado Formation (1990 ft), Castile Formation (1335 ft), and the upper Bell Canyon Formation (603 ft). The borehole stratigraphy is in normal order and there is no significant deformation. An extensive suite of geophysical logs provides information on the lithology and stratigraphy. The potentiometric surfaces of Bell Canyon fluid-bearing zones are 550 ft (for the zone at 4821 ft to 4827 ft) and 565 ft below land surface (for the zone at 4844 to 4860 ft). The WIPP is a demonstration facility for the disposal of transuranic (TRU) waste from defense programs. The WIPP will also provide a research facility to investigate the interactions between bedded salt and high level wastes.

19867 (SAND—82-0793) Natural-convection experiments in a liquid-saturated porous medium bounded by vertical coaxial cylinders. Reda, D.C. (Sandia National Labs., Albuquerque, NM (USA)). Mar 1983. Contract AC04-76DP00789. 54p. NTIS, PC A04/MF A01. Order Number DE83007469.

An experimental effort is presently underway to investigate natural convection in liquid-saturated porous media utilizing a geometry, and hydrodynamic/thermal boundary conditions, relevant to the problem of nuclear-waste isolation in geologic repositories. During the first phase of this research program, detailed measurements were made of the steady-state thermal field throughout an annular test region boundary by a vertical, constant-heat-flux, inner cylinder and a concentrically-placed, constant-temperature, outer cylinder. An overlying, constant-pressure, fluid layer was utilized to supply a permeable upper surface boundary condition. Results showed the heater surface temperature to increase with increasing vertical distance due to the buoyantly-driven upflow. The measured temperature difference (ΔT) between the average heater surface temperature and the constant outer-surface temperature was found to be progressively below the straight-line/conduction-only solution for ΔT vs. power input as the latter was systematically increased. Comparisons between measured results and numerical predictions obtained using the finit-element code MARIAH showed very good agreement, thereby contributing to the qualification of this code for repository-design applications.

19868 (SAND—82-2413C) Approach to resolution of geologic uncertainty in the licensing of a high-level-waste repository in tuff. Neal, J.T. (Sandia National Labs., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 17p. (CONF-830315—1). NTIS, PC A02/MF A01. Order Number DE83006204.

From GSA symposium on geological licensing topics in high- and low-level nuclear waste; College Station, TX, USA (3 Mar 1983).

Resolution of uncertainty in geological information is an essential element in the licensing process for a geologic repository. Evaluation of these uncertainties within the licensing framework established by the Nuclear Regulatory Commission (NRC) is required. The Nevada Nuclear Waste Storage Investigations (NNWSI), in focusing its site characterization program on unsaturated tuff, has developed a logic hierarchy of technical issues, including key issues, issues, and information needs. Key issues are statements of major requirements whose lack could be disqualifying. An example of a key issue is the demonstration of radionuclide containment and isolation within the required release limits and transport time set by the EPA and NRC. Key issues are broken down into issues, such as the groundwater flow time to the accessible environment. Resolving uncertainty ultimately comes back to satisfying individual information needs that collectively form issues. Hydraulic conductivity is an example of an information need required to determine groundwater flow rate. Sources of uncertainty often arise in either amount, quality, or other limitations in geological data. The hierarchical structuring of geological information needs provides a perspective that allows proportionate attention to be placed on various site characterization activities, and to view them within the whole range of licensing issues that must be satisfied to ensure public health and safety. However, it may not prevent an issue from being contentious, as some geological questions are known to be emotion-laden. The mitigation of uncertainty in geological information ultimately will depend on the validity and credibility of the information presented during the licensing process.

19869 (STI/PUB—622) Management of wastes from uranium mining and milling. (International Atomic Energy Agency, Vienna (Austria)). Nov 1982. 726p. (CONF-820552—). UNIPUB, Box 433, Murray Hill Station, New York, NY 10016.

From International symposium on management of waste from uranium mining and milling; Albuquerque, NM, USA (10 May 1982).

The 45 papers published in these Proceedings were presented in seven sessions covering the following subjects: review of national programs; objectives and criteria for long-term management and disposal; concept evaluation for management and disposal; characterization of wastes; waste water treatment and tailings conditioning; decommissioning and rehabilitation technology development; radiological impact assessment; environmental surveillance and monitoring; radiation measurements; and national research and development programs. In addition, there is a summary of the panel discussion on the objectives, problems and solutions for waste management in the uranium mining and milling industry.

19870 Development of structural barriers for containment of nuclear waste in basalt. Westerman, R.E.; Nelson, J.L.; Pitman, S.G. (PNL). *Transactions of the American Nuclear Society;* **41**: 283(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

19871 Materials for high-level waste canister/overpacks in salt formations. Molecke, M.A.; Diegle, R.B.; Ruppen, J.A. (Sandia National Laboratories, Albuquerque, NM 87185). *Transactions of the American Nuclear Society;* **41**: 284-285(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

19872 Nuclear waste package program for high-level isolation in Nevada tuff. Rothman, A.J. (Lawrence Livermore National Laboratory, P.O. Box 808, Livermore, CA 94550). *Transactions of the American Nuclear Society;* **41**: 285(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

19873 New directions in US waste management. Randenbush, M.H. (Stoller (S.M.) Corp., Boulder, CO (USA)); Smith, L.J. (Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant); Cruickshank, A. *Nuclear Engineering International;* **27**: No. 327, 21-26(May 1982).

Radioactive Waste Management in the United States is reviewed and the importance of politics in influencing progress is emphasised.

19874 Synroc technology for immobilizing U.S. defense waste. Newkirk, H.W.; Hoenig, C.L.; Ryerson, F.J.; Tewhey, J.D.; Smith, G.S.; Rossington, C.S.; Brackmann, A.J.; Ringwood, A.E. (Lawrence Livermore Natl Lab, CA, USA). *American Ceramic Society Bulletin;* **61**: No. 5, 559-566(May 1982).

Synroc technology has been applied to immobilize U.S. defense high level wastes similar to those stored at the Savannah

River Plant (SRP). Titanate-based ceramic waste-form specimens (Synroc D), containing simulated SRP sludge of average composition, were synthesized by conventional hot-pressing techniques. The waste-form specimens were characterized by x-ray diffraction and scanning electron microscopy, and their stability assessed by leaching methods. Major phases present are zinconolite, perovskite, spinel solid solution, nepheline, and a Cs-hollandite analog, prepared separately and added to the calcined powder before densification. Normalized single-day static leach rates for the major matrix elements in Synroc D using deionized water at 150°C are in the range 10/sup -2/ -10/sup -5/ g/m/sup 2/day. Static leach rates for cesium were 1.85 g/m/sup 2/day on the first day, decreasing to 1.7x10^{-1} b/m/sup 2/day after the third day. Dynamic leach rates for cesium in the Synroc-D waste form and in the (Ba,Cs)-hollandite analog material using deionized water at 75°C were 5x10/sup -1/ g Synroc D/m/sup 2/day on the first day, decreasing to 1.2x10/sup -2/ g Synroc D/m/sup 2/day after the 12th day, and 1x10/sup -1/g(Ba,Cs)-hollandite/m/sup 2/day on the first day, decreasing to 5x10/sup -4/ g (Ba,Cs)-hollandite/m/sup 2/day after 44 days, respectively. 45 refs.

19875 Method of deposition of silicon carbide layers on substrates. Angelini, P.; DeVore, C.E.; Lackey, W.J.; Blanco, R.E.; Stinton, D.P. US Patent Application 6-360,116. 19 Mar 1982. 18p. Contract W-7405-ENG-36.

A method for direct chemical vapor deposition of silicon carbide to substrates, especially nuclear waste particles, is provided by the thermal decomposition of methylsilane at 800 to 1050°C when the substrates have been confined within a suitable coating environment.

19876 Leach characterization of cement encapsulated wastes. Roy, D.M.; Scheetz, B.E.; Wakeley, L.D.; Barnes, M.W. (Pa State Univ, University Park, USA). *Nuclear and Chemical Waste Management;* 3: No. 1, 35-42(1982).

Matrix encapsulation of defense nuclear waste as well as intermediate-level commercial wastes within a low-temperature cementitious composite were investigated. The cements for this study included both as-received and modified calcium silicate and calcium aluminate cements. Specimens were prepared following conventional formulation techniques designed to produce dense monoliths, followed by curing at 60°C. An alternative preparation procedure is contrasted in which the specimens were "warm" pressed in a uniaxial press at 150°C at 50,000 psi for 0.5 h. Specimens of the waste/cement composites were leached in deionized water following three different procedures which span a wide range of temperatures and solution saturation conditions. Aluminate and compositionally adjusted silicate cements exhibited a better retentivity for Cs and Sr than did the as-received silicate cement. 15 refs.

19877 Concept of a canister for high-level radioactive waste. McCoy, H.E. (Oak Ridge Natl Lab, TN, USA). *Nuclear and Chemical Waste Management;* 3: No. 1, 51-57(1982).

The specific problem of developing a canister for the multibarrier waste isolation concept was considered. A conceptual design was developed for a canister that is relatively easy to fabricate, inspect, and handle. The design has the option of storing the canister or adding an overpack before storage. The costs for canisters made of three materials were estimated. Sufficient resources exist to allow the use of several common metals without significant impact on expected availability. 17 refs.

19878 Dissolution of tailored ceramic nuclear waste forms. Clarke, D.R.; Jantzen, C.M.; Harker, A.B. (Rockwell Int, Thousand Oaks, CA, USA). *Nuclear and Chemical Waste Management;* 3: No. 1, 59-66(1982).

Dissolution experiments on polyphase, high alumina tailored ceramic nuclear waste forms developed for the chemical immobilization of Savannah River Plant nuclear waste are described. Three forms of leach tests have been adopted; bulk samples conforming to the Materials Characterization Center Static Leach Test (MCC-1), a powdered sample leach test, and a leach test performed on transmission electron microscope thin foil samples. From analysis of these tests the crystalline phases that preferentially dissolve on leaching and the product phases formed are identified and related to the tailoring and processing schemes used in forming the ceramics. The thin foil sample leaching enables the role of intergranular amorphous phases as short-circuit leaching paths in polyphase ceramics to be investigated.

0530 Environmental Aspects

REFER ALSO TO CITATION(S) 19804, 19805, 19816, 19819, 19829, 19854, 19858, 19859, 19860, 19878, 19889, 19890, 21799, 21803, 21809, 22028

19879 (ANL/EIS—16) Methods for assessing environmental impacts of a FUSRAP property-cleanup/interim-storage remedial action. Wyman, D.J. (ed.). (Argonne National Lab., IL (USA)). Dec 1982. Contract W-31-109-ENG-38. 237p. NTIS, PC A11/MF A01. Order Number DE83008181.

This document provides a description of a property-cleanup/interim-storage action, explanation of how environmental impacts might occur, comprehensive treatment of most potential impacts that might occur as a result of this type of action, discussion of existing methodologies for estimating and assessing impacts, justification of the choice of specific methodologies for use in FUSRAP environmental reviews, assessments of representative impacts (or expected ranges of impacts where possible), suggested mitigation measures, and some key sources of information. The major topical areas covered are physical and biological impacts, radiological impacts, and socioeconomic impacts. Some project-related issues were beyond the scope of this document, including dollar costs, specific accident scenarios, project funding and changes in Congressional mandates, and project management (contracts, labor relations, quality assurance, liability, emergency preparedness, etc.). These issues will be covered in other documents supporting the decision-making process. Although the scope of this document covers property-cleanup and interim-storage actions, it is applicable to other similar remedial actions. For example, the analyses discussed herein for cleanup activities are applicable to any FUSRAP action that includes site cleanup.

19880 (ANL/EIS—17) Scoping survey of perceived concerns, issues, and problems for near-surface disposal of FUSRAP waste. Robinson, J.E.; Gilbert, T.L. (Argonne National Lab., IL (USA)). Dec 1982. Contract W-31-109-ENG-38. 138p. NTIS, PC A07/MF A01. Order Number DE83007849.

This report is a scoping summary of concerns, issues, and perceived problems for near-surface disposal of radioactive waste, based on a survey of the current literature. Near-surface disposal means land burial in or within 15 to 20 m of the earth's surface. It includes shallow land burial (burial in trenches, typically about 6 m deep with a 2-m cap and cover) and some intermediate-depth land burial (e.g., trenches and cap similar to shallow land burial, but placed below 10 to 15 m of clean soil). Proposed solutions to anticipated problems also are discussed. The purpose of the report is to provide a better basis for identifying and evaluating the environmental impacts and related factors that must be analyzed and compared in assessing candidate near-surface disposal sites for FUSRAP waste. FUSRAP wastes are of diverse types, and their classification for regulatory purposes is not yet fixed. Most of it may be characterized as low-activity bulk solid waste, and is similar to mill tailings, but with somewhat lower average specific activity. It may also qualify as Class A segregated waste under the proposed 10 CFR 61 rules, but the parent radionuclides of concern in FUSRAP (primarily U-238 and Th-232) have longer half-lives than do the radionuclides of concern in most low-level waste. Most of the references reviewed deal with low-level waste or mill tailings, since there is as yet very little literature in the public domain on FUSRAP per se.

19881 (LA—9398-MS) Evaluation of environmental control technologies for commercial uranium nuclear fuel fabrication facilities. Perkins, B.L. (Los Alamos National Lab., NM (USA)). Jan 1983. Contract W-7405-ENG-36. 62p. NTIS, PC A04/MF A01. Order Number DE83008362.

At present in the United States, there are seven commercial light-water reactor uranium fuel fabrication facilities. Effluent wastes from these facilities include uranium, nitrogen, fluorine, and organic-containing compounds. These effluents may be either discharged to the ambient environment, treated and recycled internally, stored or disposed of on-site, sent off-site for treatment and/or recovery, or sent off-site for disposal (including disposal in low-level waste burial sites). Quantities of waste generated and treatment techniques vary greatly depending on the facility and circuits used internally at the facility, though in general all the fluorine entering the facility as UF_6 is discharged as waste. Further studies to determine techniques and procedures that might minimize dose (ALARA) and to give data on possible long-term effects of effluent discharge and waste disposal are needed.

19882 **(NUREG—0959) User's guide for 10 CFR 61 impact analysis codes.** Widmayer, D.A. (Nuclear Regulatory Commission, Washington, DC (USA). Div. of Waste Management). Jan 1983. 134p. NTIS, PC A07/MF A01 - GPO $6.00. Order Number DE83901490.

This document explains how to use the Impact Analysis Codes used in the Draft Environmental Impact Statement (DEIS) (NUREG-0782, Vol. 1-4) supporting 10 CFR 61, Licensing Requirements for Land Disposal of Radioactive Waste. The mathematical development of the impact Analysis Codes and other information necessary to understand the results of using the Codes is contained in the DEIS, and in a supporting document, Data Base for Radioactive Waste Management (NUREG/CR-1759, Vol. 1-3). This document was prepared with the intention of accompanying a computer magnetic tape containing the Impact Analysis Codes. A form is included at the end of this document which can be used to obtain such a tape.

19883 **(NUREG/CR—2394) PATH1 self-teaching curriculum: example problems for Pathways-to-Man Model.** Helton, J.C.; Finley, N.C. (Sandia National Labs., Albuquerque, NM (USA)). Oct 1982. Contract AC04-76DP00789. 116p. (SAND—81-2377). NTIS PCE06/MF $4.75 - GPO $7.00. Order Number DE83007228.

The Pathways-to-Man Model was developed at Sandia National Laboratories to represent the environmental movement and human uptake of radionuclides. This model is implemented by the computer program PATH1. The purpose of this document is to present a sequence of examples of facilitate use of the model and the computer program which implements it. Each example consists of a brief description of the problem under consideration, a discussion of the data cards required to input the problem to PATH1, and the resultant program output. These examples are intended for use in conjunction with the technical report which describes the model and the computer progam which implements it (NUREG/CR-1636, Vol 1; SAND78-1711). In addition, a sequence of appendices provides the following: a description of a surface hydrologic system used in constructing several of the examples, a discussion of mixed-cell models, and a discussion of selected mathematical topics related to the Pathways Model. A copy of the program PATH1 is included with the report.

19884 **(NUREG/CR—2675) Relevance of biotic pathways to the long-term regulation of nuclear waste disposal. Topical report on reference eastern humid low-level sites.** McKenzie, D.H.; Cadwell, L.L.; Eberhardt, L.E.; Kennedy, W.E. Jr.; Peloquin, R.A.; Simmons, M.A. (Pacific Northwest Lab., Richland, WA (USA)). Jan 1983. Contract AC06-76RL01830. 56p. (PNL—4241-Vol.3). NTIS, PC A04/MF A01 - GPO $4.75. Order Number DE83007188.

The purpose of the work reported here was to develop an order-of-magnitude estimate for the potential dose to man resulting from biotic transport mechanisms at a humid reference low-level waste site in the eastern US. A description of the reference site is presented that includes the waste inventories, site characteristics and biological communites. Parameter values for biotic transport processes are based on data reported in current literature. Transport and exposure scenarios are developed for assessing biotic transport during 500 years following site closure. Calculations of radionuclide decay and waste container decomposition are made to estimate the quantities available for biotic transport. Doses to man are calculated for the biological transport of radionucludes at the reference site after loss of institutional control. These dose estimates are compared to dose estimates we calculated for the intruder-agricultural scenarios reported in the DEIS for 10 CFR 61 (NRC). Dose to man estimates as a result of cumulative biotic transport are calculated to be of the same order-of-magnitude as the dose resulting from the more commonly evaluated human intrusion scenario. The reported lack of potential importance of biotic transport at low-level waste sites in earlier assessment studies is not confirmed by findings presented in this report. Through biotic transport, radionuclides can be moved to locations where they can enter exposure pathways to man.

19885 **(NUREG/CR—3032) Studies of transport of waste radionuclides, through soil at the Maxey Flats, Kentucky, waste-burial site.** Fowler, E.B.; Polzer, W.L.; Essington, E.H. (Los Alamos National Lab., NM (USA)). Jan 1983. Contract W-7405-ENG-36. 72p. (LA—9565-MS). NTIS, PC A04/MF A01. Order Number DE83007771.

Two areas at the waste-burial site are being used to study the interaction of soil with liquid waste - one near Trench 19S and the other between an experimental trench and Trench 27. Analyses of soil solutions near Trench 19S indicate that radionuclides have migrated from the waste-burial trench. The observed distribution of radionuclides in that area suggests that ^{3}H, as tritiated water, has moved the greatest distance. Movement of ^{137}Cs is essentially nonexistent. The migration of ^{238}Pu and ^{60}Co lies between those two extremes. The distance that ^{3}H has moved, at an approximated depth of 4 m, is about 9 m. Additional porous cup samplers were installed at depths to 8 m to better evaluate the distribution of radionuclides near Trench 19S. Results from soil moisture measurements by R.K. Schulz of the University of California at Berkeley indicate a preferential movement of water into the waste trench through its cap. Our study of the ^{3}H in surface soils outside the perimeter fence of the burial site suggests that contamination of the near-surface soil water occurs and could be from an airborne source, possible originating from the site evaporator. Another localized source could be associated with underflow from a burial trench that surfaces outside the perimeter fence. The ^{3}H content in some soil solutions near an experimental trench suggest a preferential movement of water along an interface of an original soil profile and the overlying landfill. If such an interface were to intercept a burial trench and also outcrop off site, it could act as a preferential pathway for transport of radionuclides off site. The nonsorptive behavior of a small fraction of ^{238}Pu in the Maxey Flats waste was interpreted as having been caused by an organic complex that is very slowly biodegradable. Organic constituents in the Maxey Flats soil, Tilsit Ap, may complex some of the ^{238}Pu, making it mobile for some period of time.

19886 **(PB—82-251992) Contamination of ground and surface waters due to uranium mining and milling. Volume I: Biological processes for concentrating trace elements from uranium mine waters. Open file report 25 Jul 79-14 Sep 81.** Brieley, C.L.; Brierley, J.A. (New Mexico Bureau of Mines and Mineral Resources, Socorro (USA)). Nov 1981. 105p. NTIS, PC A06/MF A01.

Wastewater from uranium mines in the Ambrosia Lake district near Grants, N. Mex., contains uranium, selenium, radium, and molybdenum. A novel treatment process for waters from two mines, sections 35 and 36, to reduce the concentrations of the trace contaminants was developed. Particulates are settled by ponding and the waters are passed through an ion exchange resin to remove uranium; barium chloride is added to precipitate sulfate and radium from the mine waters. The mine waters are subsequently passed through three consecutive algae ponds prior to discharge. Water, sediment, and biological samples were collected over a 4-year period and analyzed to assess the role of biological agents in removal of inorganic trace contaminants from the mine waters.

19887 **(RHO-BW-ST—35P) Radionuclide sorption on basalt-interbed materials. Annual report FY 1981.** Barney, G.S. (Rockwell International Corp., Richland, WA (USA). Energy Systems Group). Oct 1982. Contract AC06-77RL01030. 70p. NTIS, PC A04/MF A01. Order Number DE83008062.

Sorption and precipitation of key radionuclides in the groundwater/rock systems expected in Columbia River interbed zones were investigated. Sorption isotherms were defined for sorption of Cs, Sr, Se, Tc, Ra, U, Np, and Am on an interbed sandstone standard from the Rattlesnake Ridge interbed. In addition, the effect of groundwater composition and redox potential on sorption and precipitation of these radionuclides on interbed sandstone and tuff were studied. Isotherms were measured at 23°C, 60°C, and 85°C. The Freundlich equation accurately fits the isotherm data when precipitation does not occur. Solubility limits were obtained for technetium and selenium using the isotherms. Cesium, selenium, technetium, uranium, and americium sorption are strongly affected by temperature over the 23°C to 85°C range. The major chemical components of Grande Ronde groundwater (Na^+, Ca^{2+}, K^+, Mg^{2+}, Cl^-, F^-, CO_3^{2-}, HCO_3^-, and SO_4^{2-}) were studied for their influence on sorption and precipitation. Statistically designed experiments identified significant groundwater components and measured their effects. The results gave evidence for selecting sorption mechanisms for each radionuclide (ion exchange, chemisorption, redox reactions, complex formation, or precipitation). Strontium, radium, and cesium are sorbed by ion exchange and compete for exchange sites with ions of similar size. Neptunium, plutonium, and technetium are reduced by hydrazine to their (IV) oxidation states and are sorbed by chemisorption. Selenium is not reduced to the metal by hydrazine, but appears to be precipitated as a calcium compound. The groundwater variables had little effect on americium sorption. A slightly soluble americium compound appears to form which is more soluble at low pH.

19888 (UCID—19729) Leaching study of nuclear melt glass: Part I. Failor, R.A.; Coles, D.G.; Rego, J.A.H. (Lawrence Livermore National Lab., CA (USA)). 23 Feb 1983. Contract W-7405-ENG-48. 76p. NTIS, PC A05/MF A01. Order Number DE83008312.

Ground samples of three nuclear melt glasses from underground nuclear explosions at the Nevada Test Site (NTS) were leached at 25°C with natural ground water from NTS. Using our dynamic single-pass flow-through leaching system we monitored the release of radionuclides from the glasses during 420 days of leaching. We continually flowed the ground water over the melt glass at flow rates of 185 ml/day for half of the samples and 34 ml/day for the rest. Leachate solutions were collected continuously, and composite samples, collected on days 1, 2, 3, 6, 11, 32, 38, 70, 120, 230 and 420, were analyzed using low-background Ge(Li) gamma spectrometers. For most of the radionuclides the leach rate decreased smoothly throughout the experiment. Except for ^{95}Zr, ^{144}Ce, and ^{155}Eu, there was no difference between the fast (185 ml/day) and slow (34 ml/day) flow-rate leach rates. The measurable leach rates ranged from a high of 1×10^{-2} g-glass/m^2 day for ^{22}Na (slow flow-rate, day 1 in glass No. 2) to a low of 1×6^{-6} g-glass/m^2 day for ^{54}Mn (slow flow-rate, day 420 in glass No. 2). Most of the leach-rate values were about 5×10^{-4} g-glass/m^2 day initially, decreasing to 5×10^{-6} g-glass/m^2 day after 420 days of leaching. The leach rates had not leveled off by the end of the experiment and were, in general, continuing to decrease. From the activities in the leachate solutions, we determined the percent of the pre-leach activity leached from the melt glasses during the experiment. Only ^{124}Sb, in one fast flow-rate channel of glass No. 2, exceeded 3% of the initial activity leached. The majority of the samples released less than 1% of the pre-leach activity for a given radionuclide. The percent activity released from the samples leached at the fast and slow flow rates were nearly equal.

0540 Health And Safety

REFER ALSO TO CITATION(S) 19804, 19805, 19813, 19815, 19816, 19870, 19872, 19883, 20561, 21360, 21361, 21362, 21363, 21364, 21365, 21366, 21587

19889 (ANL—83-6) Environmental surveillance of the Palos Park Forest Preserve. Golchert, N.W.; Sedlet, J.; Hayes, K.A. (Argonne National Lab., IL (USA)). Jan 1983. Contract W-31-109-ENG-38. 72p. NTIS, PC A04/MF A01. Order Number DE83007809.

This is the second report describing an ongoing environmental surveillance program conducted at the Palos Park Forest Preserve near Chicago, Illinois. The Preserve was a site of a nuclear research laboratory (Site A) from 1943 to 1956 and a radioactive waste burial site (Plot M) from 1944 to 1949. An extensive radiological characterization of the site was conducted from February 1976 to August 1977, and tritium in the form of water was found to be the only radionuclide that migrated from the nuclear facilities. The results were published in US Department of Energy Report DOE/EV-0005/7. The present report summarizes the earlier findings and gives the detailed results of the work from August 1977 through December 1981. The vertical and horizontal distribution of tritium within the glacial till was determined from measurements of tritium in soil moisture. Chemical and radiochemical analyses were performed on a number of wells in the area. Tritiated water continued to be the only species that was observed to have migrated from the Plot M area. Migration from the Site A area was not observed. The concentration of tritium at the Red Gate Woods well, 1200 ft downgradient from Plot M, continued to show the seasonal fluctuations of high concentrations in the winter and low concentrations in the summer. Monitoring of the Palos Park area is continuing.

19890 (DOE/EV—0005/22) Formerly utilized MED/AEC sites remedial action program. Radiological survey of the National Guard Armory at Washington Park, 52nd Street and Cottage Grove Avenue, Chicago, Illinois, September 19, 1977-October 11, 1978. Wynveen, R.A.; Smith, W.H.; Mayes, C.B.; Justus, A.L. (Argonne National Lab., IL (USA)). Jan 1983. Contract W-31-109-ENG-38. 135p. (ANL-OHS/HP—83-100). NTIS, PC A07/MF A01. Order Number DE83007808.

A comprehensive radiological survey was conducted at the Illinois National Guard Armory at Washington Park in Chicago. This facility, used for uranium processing during the MED/AEC era, is now used as offices, classrooms, and storage and garage areas. Forty-two spots of contaminaton in nine rooms or areas exceeded the allowable limits for uranium as given in the ANSI Standard N13.12. In most instances, the contamination was found to be removable and available for transfer to other locations. However, under current use conditions, the potential for radiation exposure to occupants of this building from these sources of contamination is small. Concentrations of radon daughters in the air in the building, as measured by grab-sampling techniques, were less than the limit of 0.01 WL above background as given in the Surgeon General's Guidelines in 10 CFR 712. No long-lived radionuclides were detected in any air sample. Concentrations of radionuclides in soil samples collected around the facility indicated essentially background levels. The presumed maximum 50-year dose commitments from potential inhalation/ingestion of residual contamination were calculated to be 2.5 mrem to the lung, 0.51 mrem to the bone, 0.12 mrem to the kidney, and 0.031 mrem wholebody; each of these is less than 0.5% of the appropriate standards for an individual in an uncontrolled area. In order to rduce the potential for radiation exposure, remedial measures such as stabilization of the contamination in place would be applicable as a short-term measure. In order to reduce the risk in the event that building modifications take place in the future, health physics procedures and coverage are recommended. The long-term solution would involve dcontamination by removal of the radioactive residues from the 11 rooms or areas in the facility.

19891 (DOE/LLW—17T) Survey of chemical and radiological indexes evaluating toxicity. National Low-Level Radioactive Waste Management Program. (EG and G Idaho, Inc., Idaho Falls (USA)). Mar 1983. Contract AC07-76ID01570. 140p. NTIS, PC A07/MF A01. Order Number DE83008307.

This document reviews and evaluates 18 chemical and radiation standards, criteria, and measures that might form the basis of a combined radiochemical toxicity index for low-level radioactive waste. Six measures are recommended for the index basis and evaluated in greater detail. These measures include Water Quality Criteria, Lethal Dose and Concentration Levels, short-term bioassay, Multimedia Environmental Goals, and radiological dose factors.

19892 (NUREG/CR—3120) Quality assurance for measurements of ionizing radiation. Annual report for FY 1982. Eisenhower, E.H.; Ehrlich, M.; Soares, C.; Schima, F.J.; Seltzer, S. (National Bureau of Standards, Washington, DC (USA)). Feb 1983. 73p. NTIS, PC A04/MF A01 - GPO $5.00. Order Number DE83901533.

This report describes results of the second year of a program that will enable the Nuclear Regulatory Commission to improve, demonstrate, and document traceability of its measurements to the national physical measurement standards for ionizing radiation. The principal actions being taken are: (1) characterization of the response of thermoluminescence dosimetry systems used for routine surveillance of nuclear facilities; (2) type testing and characterization of portable survey instruments; and (3) implementation of routine quality assurance services that will demonstrate that regulatory measurements are sufficiently consistent (in agreement) with national measurement standards. During the year, some tests of the TLD system were performed as specified in American National Standard N545-1975, specifically self-irradiation, directional dependence, humidity dependence at extreme temperatures, and salt spray. Measurement assurance tests were conducted for the NRC Region-1 laboratory. The response of six portable survey instruments to beta radiation from xenon-133 was determined using a specially-built chamber for exposure to gaseous sources. The basic principles under which the long-range interactive MQA program will operate have been developed and documented, along with procedures for obtaining essential information from participating laboratories.

19893 (PB—83-114868) Engineering evaluation of radon daughter removal techniques. Open file report (final). Lindsay, D.B.; Lawter, J.R.; Jashnani, I. (Little (Arthur D.), Inc., Cambridge, MA (USA)). Apr 1978. 209p. NTIS, PC A10/MF A01.

This report presents the findings of an investigation of a number of techniques for cleaning ambient air with special emphasis on their applicability to the removal of the short-lived radioactive decay products of 222-radon, the so-called 'radon daughters' that have been identified with the induction of lung cancer in underground uranium miners. The purpose of the study was to review the requirements for control of radon daughter concentrations in mine air, and to examine all techniques whose feasibility has been demonstrated in principle and that would be capable of meeting those requirements. The study included a review of all pertinent literature, both technical and proprietary, on the subject of the control of miner exposure to the radon daughters and in the area of potentially applicable air-cleaning technology. Information about the nature of the problem and about the experience of the uranium mining industry in applying air-cleaning methods to its solution was obtained by visiting mines where such methods are in use and by correspondence and telephone conversations with other industry sources.

19894 (PNL-SA—10696) Beta measurement evaluation and upgrade. Murphy, D.W.; Faust, L.G.; Selby, J.M.; Essig, T.H.; Vallario, E.J. (Pacific Northwest Lab., Richland, WA (USA); Department of Energy, Washington, DC (USA)). Jan 1983. Contract AC06-76RL01830. 5p. (CONF-830204—7). NTIS, PC A02/MF A01. Order Number DE83007842.

From International beta dosimetry symposium; Washington, DC, USA (15 Feb 1983).

The Department of Energy (DOE), Office of Nuclear Safety, initiated a program to evaluate dosimeters and instruments used at DOE laboratories in the determination of personnel beta dose. The program focuses on significant problems which affect field measurements and is involved in the development and evaluation of new beta dosimetry systems (both dosimeters and instruments). Currently the program is reviewing systems and practices; developing calibration systems and procedures for the calibration of instruments and dosimeters; and developing new concepts which may improve beta dosimetry. The program has been designed to provide a continuing effort for resolution of problems of assessing personnel beta dose at DOE facilities. The current personnel beta dosimetry practices at DOE facilities are being surveyed.

0550 Regulations

REFER ALSO TO CITATION(S) 19811, 19812, 19868, 20421, 20703

19895 (CONF-821119—13) Isotope correlations for safeguards surveillance and accountancy methods. Persiani, P.J.; Kalimullah. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 21p. (IAEA-SM—260/85). NTIS, PC A02/MF A01. Order Number DE83007746.

From International symposium on recent advances in nuclear materials safeguards; Nienna, Australia (8 Nov 1982).

Isotope correlations corroborated by experiments, coupled with measurement methods for nuclear material in the fuel cycle have the potential as a safeguards surveillance and accountancy system. The ICT allows the verification of: fabricator's uranium and plutonium content specifications, shipper/receiver differences between fabricator output and reactor input, reactor plant inventory changes, reprocessing batch specifications and shipper/receiver differences between reactor output and reprocessing plant input. The investigation indicates that there exist predictable functional relationships (i.e. correlations) between isotopic concentrations over a range of burnup. Several cross-correlations serve to establish the initial fuel assembly-averaged compositions. The selection of the more effective correlations will depend not only on the level of reliability of ICT for verification, but also on the capability, accuracy and difficulty of developing measurement methods. The propagation of measurement errors through the correlations have been examined to identify the sensitivity of the isotope correlations to measurement errors, and to establish criteria for measurement accuracy in the development and selection of measurement methods. 6 figures, 3 tables.

19896 (NUREG—0430-Vol.3-No.1) Licensed fuel facility status report. Inventory difference data, January-June 1982. (Nuclear Regulatory Commission, Washington, DC (USA). Office of Inspection and Enforcement). Feb 1983. 14p. NTIS, PC A02/MF A01 - GPO. Order Number DE83901536.

NRC is committed to the periodic publication of licensed fuel facilities inventory difference data, following agency review of the information and completion of any related investigations. Information in this report includes inventory difference data for active fuel fabrication facilities possessing more than one effective kilogram of high enriched uranium, low enriched uranium, plutonium, or uranium-233.

19897 (NUREG/CR—2935) Examples of MC and A systems to meet prompt accountability specifications. Eggers, R.F.; Brouns, R.J.; Bryant, J.L.; Davenport, L.C.; Brite, D.W.; Kinnison, R.R.; Fager, J.E.; Williams, R.C.; Wilson, R.L. (Pacific Northwest Lab., Richland, WA (USA)). Jan 1983. Contract AC06-76RL01830. 292p. (PNL—4336). NTIS, PC A13/MF A01 - GPO $8.50. Order Number DE83007534.

Proposed regulations for NRC licensees authorized to possess and process formula quantities of strategic special nuclear material (SSNM) would require each licensee to implement a material control and accounting (MC and A) system capable of prompt loss detection and alarm resolution. In support of the loss detection and alarm response activities an overcheck program would also be implemented. This program would include personnel qualification and training, quality control, inventory verification and shipper-receiver transaction verification. However, the frequeny of physical inventory verification would be about once per year rather than once every two months. In addition MC and A activities would include procedures for the prevention and detection of data falsification and other forms of deceit that might undermine the performance of the loss detection and response systems. This report provides examples of prompt accountability systems for four plants: mixed oxide fuel fabrication, uranium hexafluoride conversion, high enriched uranium fuel fabrication, and high enriched uranium scrap recovery. Purpose of this report is to provide guidance to the MC and A system designer and evaluator on how the proposed requirements might be met.

19898 **Model for absorption-modified multiplication effects in the assay of HEU-containing powders in a random driver.** Winslow, G.H. (Argonne Natl Lab, IL, USA). *Nuclear Materials Management;* 10: No. 1, 28-33(Spr 1981).

A model has been developed which describes the enhancement of the response, in a random driver, of a "stack" of highly enriched uranium of arbitrary height over the integral of the response of infinitessimal layers that would be produced solely by the interrogating sources which are external to the stack. It has been suggested that this method of modeling should also be applicable to powders. This paper is a report on the form the model takes for that application. 4 refs.

19899 **Demonstration of near-real-time accounting: the AGNS 1980 miniruns.** Cobb, D.D.; Dayem, H.A.; Baker, A.L.; Ellis, J.H.; Ehinger, M.H.; Crawford, J.M. (Los Alamos Natl Lab, NM, USA). *Nuclear Materials Management;* 10: No. 1, 34-43(Spr 1981).

During 1980-81 a series of minirun experiments was being conducted at the AGNS Barnwell Nuclear Fuels Plant. Each experiment consists of operating the second and third plutonium cycles continuously for approximately one week using natural uranium solutions. One of the main objectives of the miniruns is to demonstrate near-real-time accounting and control techniques in a large, modern reprocessing facility. The results of five of these miniruns during 1980 are reported. 8 refs.

06 FUSION FUELS

0602 Processing

19900 **Low density, microcellular foams, preparation, and articles.** Young, A.T. US Patent Application 6-354,553. 3 Mar 1982. 19p. Contract W-7405-ENG-36.

A microcellular low-density foam of poly(4-methyl-1-pentene) particularly useful for forming targets for inertial confinement fusion has been developed. Articles made from the foam have been machined to tolerances of 0.0001 inch, although the densities of the fragile foam are low (about 10 to about 100 mg/cc) and the cell sizes are small (about 10 to about 30 μm). Methods for forming the foam and articles are given. The yield strength of the foam of the invention is higher than was obtained in other structures of this same material.

07 ISOTOPE AND RADIATION SOURCE TECHNOLOGY

19901 **(ANL/NESC—874) SANDIA-ORIGEN; isotope generation & depletion.** Bennett, D.E. (Sandia National Labs., Albuquerque, NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048874.

Maxima of - 10 discrete time-steps per subcase. .

SANDIA-ORIGEN is a point code (no spatial dependence) which calculates detailed isotopic compositions for a wide range of problems involving nuclear reactor fuel irradiation, neutron activation, and radioactive decay. A nuclear data library file of 1,063 isotopes provides nuclear parameters, neutron cross sections, and gamma photon production data for four reactor types: high-temperature, gas-cooled (HTGR), light water (LWR), liquid-metal fast-breeder (LMFBR), and molten-salt breeder (MSBR). Versatile options for blending and reprocessing of reactor fuel are included.CDC7600,6600,6400; FORTRAN IV (FTN4.6(439) FORTRAN compiler, optimization level 2); SCOPE 2.1.5; Approximately 104K (octal) words of SCM and 156K (octal) words of LCM are required for execution on a CDC7600.

0701 Physical Isotope Separation

19902 **(ANL/NESC—179) ISOTOPES; maximum yield from reaction or decay.** Furman, A. (Lockheed Missiles and Space Co., Sunnyvale, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048179.

The number of flux values used may range from 2 to a maximum of 100 for each individual reaction and decay problem.

This program can be used to calculate for any neutron flux the optimum time of irradiation for maximum yield, the specific activity of the product isotope in curies per gram of target material, and the combined specific activity of the target and product isotopes. The product isotope may be produced by any simple reaction such as (n,gamma), (n,p), (n,2n), etc., or it may be produced by decay of a parent isotope.UNIVAC1100; FORTRAN V; EXEC8; Less than 3600 words of memory were used in executing the sample problem.

19903 **(ANL/NESC—903) COLCO; thermal diffusion column coefficients.** Rutherford, W.M. (Monsanto Research Corp., Miamisburg, OH (USA). Mound). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048903.

Maxima of - 100 temperature points 100 omega integrals 50 entries in the gas property table 50 entries in the liquid property table.

COLCO calculates thermal diffusion column coefficients from theory. The program can be used for both liquid-phase and gas-phase thermal diffusion columns. Column coefficients for the gas-phase can be based on gas properties calculated from kinetics theory using tables of omega integrals or on tables of compiled physical properties as functions of temperature. Column coefficients for the liquid-phase can be based on compiled physical property tables.IBM360,303x;CDC6600,CYBER175; FORTRAN IV; OS/360 (IBM360), SCOPE 3.4, NOS/BE 1.3 (CDC6600); 70K bytes of memory are required for execution of the IBM360 version; 23,000 (octal) words of memory are required for the CDC6600 version.

0702 Radiation Sources

REFER ALSO TO CITATION(S) 21498, 21518, 21911, 21966

19904 **(ANL/NESC—258) EXPN; analysis of pulsed neutron source data.** Peterson, C.L. (General Electric Co., San Jose, CA (USA). Nuclear Energy Div.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048258.

EXPN analyzes pulsed neutron data using the Garelis-Russel technique (reference 1). Basically the code computes the prompt decay constant, alpha, and the parameter (k*beta/l) from experimental data, which is directly extracted from a time analyzer storage memory and read onto a punched paper tape. The alpha-determination part of the code was originally obtained under the name EXPLICIT from Knolls Atomic Power Laboratory but has since been modified. The code provides options for a pre-burst or a post-burst background analysis. That is, the parameters alpha and (k*beta/l) are obtained using a background measured prior to the burst or measured after the burst.GE635; FORTRAN IV; GE635 GECOS; 35K machine with input and output media.

19905 **(ANL/NESC—367) ISOGEN; radionuclide generation and decay.** Tuyl, H.H.V. (Pacific Northwest Lab., Richland, WA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048367.

Maxima of - 30 time-steps involving either irradiation or decay 50 members in a single chain 500 nuclides in a single case.

ISOGEN calculates radioisotope generation and decay, using two-group neutron cross sections.UNIVAC1108; FORTRAN

V; EXEC2; 65K memory and one tape very helpful, but not essential.

19906 (SAND—82-2002C, pp 21-29) **Zetatron neutron generating tube revisited.** Shope, L.A. Jan 1983. NTIS, PC A08/MF A01.

From 2. prompt fussion neutron uranium logging seminar; Albuquerque, NM, USA (19 May 1981).

The predecessor of the Zetatron neutron generating tube came into being at the request of NASA for a small neutron source for use in activation analysis. The tube continued its life in a second version as a highly repeatable neutron source for calibrating neutron detectors and measuring neutron attenuation in materials. The most recent version has found application in uranium borehole logging, portal security monitoring, and transuranic assaying. Its physical size is 38 mm diameter with source magnet in placce by 126 mm long. It is operated in a pulse mode on both the ion source and the accelerating voltage. The tube utilizes the D-T reaction, accelerating a mixed beam from the ion source onto an occluded gas target, also of a D-T mixture. Details of the tube processing and the tube operation and characteristics follow.

19907 (SAND—82-2002C, pp 30-37) **Pulse neutron generator design update.** Thibideau, F.D. (General Electric Co., St. Petersburg, FL). Jan 1983. NTIS, PC A08/MF A01.

From 2. prompt fussion neutron uranium logging seminar; Albuquerque, NM, USA (19 May 1981).

This paper describes a neutron generator which was developed at the request of Sandia National Laboratories, Albuquerque, New Mexico, for use in the Sandia-developed uranium logging probe. The principal changes that have evolved since the earlier description include: diameter reduced from 603 mm (2.375 in) to 540 mm (2.125 in), neutron tube accelerator voltage increased from about 100 kV to about 125 kV, and controlatron neutron tube replaced by the Zetatron neutron tube (this added electron suppression). The changes were made to increase clearance when used in small diameter boreholes, increase operational life, and improve neutron output. Circuit and construction modifications which accomplished these changes are included in the text.

08 HYDROGEN

REFER ALSO TO CITATION(S) 20143

0801 Production

REFER ALSO TO CITATION(S) 19450, 19999, 20000, 20001, 20814, 21266, 21270, 21274

19908 (EUR—7010-EN) **Thermodynamic and engineering assessment of hybrid processes for the production of hydrogen with specific application to the Mark 13 process.** Joels, R.K. (Commission of the European Communities, Luxembourg). 1981. 120p. Available from Commission of the European Communities, Luxembourg.

A single hybrid process based upon the reaction of sulphur dioxide, bromine and water was first studied on a thermodynamic basis. A more detailed engineering analysis followed in which the various separation steps were defined and the heat recuperation possibilities investigated. After defining the nuclear reactor-chemical process link, a hydrogen production cost was then estimated. Finally, parametric analyses illustrated the effects of variations upon input data.

19909 (EUR—7115-DE) **Development of a method of preparing ZrO_2 (Y_2O_3) thin film electrolytes on porous supporting materials.** Dietrich, G.; Doenitz, W.; Hermeking, H.; Oehme, G.; Wahl, J. (Commission of the European Communities, Luxembourg). 1981. 84p. (In German). Available from Commission of the European Communities, Luxembourg.

The investigation aimed at the development of a process for preparation of thin films of yttrium-stabilized ZrO_2 electrolytes. Electrolyte losses can be dramatically reduced by reducing the electrolyte thickness in high-temperature electrolysis, and the flexibility of vapour electrolyses is increased. For example, low-temperature vapour can be used as feed vapour without lowering the process efficiency. In the process developed, thin ZrO_2/Y_2O_3 electrolyte films, which are not self-supported, are deposited on a porous supporting material. At the some time, suitable electrodes had to be developed as electrical contacts with the electrolyte.

19910 (EUR—7573-EN) **Novel oxides having high protonic conductivity as electrolyte for low temperature water vapour electrolysis.** (Commission of the European Communities, Luxembourg). 1981. 29p. Available from Commission of the European Communities, Luxembourg.

The following materials were examinated: γ-AlOOH, α-FeOOH, SbOOH, $H(H_2O)$sub(x) β''alumina. All the materials have been characterised by means of chemical analysis, X-rays, thermogravimetry, I-R spectroscopy and surface measurements. Furthermore the protonic conduction characteristic of the materials have been tested by means of E.M.F. and conductivity measurements.

19911 (EUR—7610-EN) **Gas bubble behaviour and ohmic potential drop during water electrolysis.** Sillen, C.W.M.; Janssen, L.J.J.; Geraets, J.; Goedkoop-Kooijman, A.G. (Commission of the European Communities, Luxembourg). 1981. 91p. Available from Commission of the European Communities, Luxembourg.

The aim of the hydrogen program of EG is minimization of energy losses during water electrolysis. This investigation contributes to the fundamentals for an advanced water electrolysis. The subjects of the present study are the following: the behaviour of bubbles at perforated electrodes pressed against diaphragms of different materials, the ohmic resistance of a layer of solution between diaphragm and working electrode and the bubble size and distribution in the solution leaving the electrolytic cell. When using an electrode with gaps in it pressed against a diaphragm, it is very important that the gaps remain free of gas bubbles. Whether or not the gaps are filled up by bubbles, depends on material of diaphragm and on the geometry of electrode. It has been found that the best electrode, in this respect, of the ones which have been investigated is the expanded metal gauze electrode. However, pressing this electrode type against the diaphragm, the latter is often damaged, since this electrode has gaps mostly with very sharp edges. For perforated plate electrodes it is observed that the round gaps are easily filled up with large bubbles, (very unfavourable), if a diaphragm of nafion, $K_2Ti_8O_{13}$/PTEE, Polysulfone or ZrOsub(x)/PTEE is used. Asbestos or PAM/PS-diaphragms act differently: no large bubble fill up the gaps.

19912 (EUR—7794-EN) **Properties and electron transfer reactivity of coordination compounds for the photochemical splitting of water.** Moggi, L. (Commission of the European Communities, Luxembourg). 1982. 49p. Available from Commission of the European Communities, Luxembourg.

Photochemical, photophysical, and electrochemical properties have been determined for the excited states of many polypyridine complexes of Cr(III), Ru(II), Os(II), Rh(III), and Ir(III), in relation with the use of these compounds in cyclic photochemical systems for the splitting of water. Some of the complexes were also tested in sacrificial systems for the production of H_2, but the results obtained are not satisfactory. Studies were also performed which gave an experimental support to theoretical methods of evaluating the redox properties of excited states and foreseeing the nature (energy of electron transfer) of bimolecular reactions of excited states. These methods involve calculations based on simple thermodynamic data. In the field of the identification of the electronic factors which may affect the rate of the electron transfer processes, we have only obtained preliminary results, which may serve as a basis for more extended and systematic researches.

19913 (EUR—7870-EN) **Design and construction of electrolyzers with solid electrolyte using Nafion membranes. Final report.** (Panclor S.p.A., Milan (Italy)). 1982. 56p. European Community Information Service, 2100 M Street, N.W., Suite 707, Washington, DC 20037.

A cell model was used to evaluate the advantages and perspectives offered by an electrolyzer based on a solid polymeric electrolyte such as Nafion. The 20-kW cell model was only run at a maximum pressure of 5 bar and a temperature of 120°C. The only adequate technique for the activation of the Nafion membrane consisted of a rather complex cycle, ending with the deposition of nickel under controlled reduction conditions. In order to remove cost limitations, a lithiated solid polymeric electrolyte was used instead of an acid system as used by General Electric. This allowed the use of conventional materials, as for the usual alkaline electrolysis. Current collectors have been selected in the form of nickel wire knit mesh type mats, pre-stressed in order to obtain a good elastic response. Applied pressures in the order of 1 kg/cm^2 gave resistivity values of about 0.1 Ω cm^2 in electrical current transfer. The cell fluidodynamics was fully investigated, and adequate equations were derived to describe the two-phase flow patterns inside the cell and in the piping providing natural circulation of the process liquid. A specific computer program was prepared and used in cell design. Structural materials have been adequately selected and tested. Two cell prototypes, having design pressures of 5.5 and 33 bar have been constructed. The first was tested in the frame of an adequate pilot plant, providing a mathematical model for cell voltage as function of the temperature and the current density. The collected results will be a basis for the design of a future 100-kW unit.

19914 **(N—8228788) Autothermal reforming of sulfur-free and sulfur-containing hydrocarbon liquids.** (Jet Propulsion Lab., Pasadena, CA (USA)). Oct 1981. 74p. NTIS, PC A07/MF A01.

The mechanisms by which various fuel component hydrocarbons related to both heavy petroleum and coal-derived liquids are converted to hydrogen without forming carbon were investigated. Reactive differences between paraffins and aromatics in autothermal reforming (ATR) were shown to be responsible for the observed fuel-specific carbon formation characteristics. The types of carbon formed in the reformer were identified by SEM and XRD analyses of catalyst samples and carbon deposits. From tests with both light and heavy paraffins and aromatics, it is concluded that high boiling point hydrocarbons and polynuclear aromatics enhance the propensity for carbon formation. The effects of propylene addition on the ATR performance of benzene are described. In ATR tests with mixtures of paraffins and aromatics, synergistic effects on conversion characteristics were identified. Indications that the sulfur content of the fuel may be the limiting factor for efficient ATR operation were found. The conversion and degradation effects of the sulfur additive (thiophene) were examined.

19915 **(PB—82-227612) Solar-assisted hydrogen generation by photoelectrocatalysis. Annual report mar 80-feb 81.** Ang, P.G.P.; Richardson, P.F.; Yen, P.H.; Tiller, A.J.; Rossignuolo, A.A. (Institute of Gas Technology, Chicago, IL (USA)). Mar 1982. 63p. NTIS, PC A04/MF A01.

Improved photoanodes were developed by surface modification of oxide semiconductor electrodes. Semiconductors evaluated were iron oxide, strontium titanate, and titanium dioxide.

19916 **(PB—82-231622) Photolysis of water for production of fuel gases. Annual report Jan-Dec 80.** Eror, N.G. (Oregon Graduate Center, Beaverton (USA)). Jan 1981. 346p. NTIS, PC A15/MF A01.

In order to make the photocatalytic decomposition of water an economically viable process for production of hydrogen or other fuel gases, progress needs to be made in the basic science, and the ability to use that science in technology. In order to develop semiconductor electrodes for the photolysis of water that have efficiencies greater than 10%, it will be necessary to move beyond the semiempirical method. The defect structure of pure as well as donor and acceptor doped strontium titanate (SrTiO3) was determined. Contrary to what was previously reported, SrTiO3 was found to be an excellent analog of barium titanate (BaTiO). The solubility of lanthanum is very high in SrTiO3 (40 at .%) and is self compensated at high oxygen activities (air). Various models were proposed to account for the wide range of point defects encountered in both intrinsic and extrinsic SrTiO3. Electrical conductivity measurements at both high and low temperatures; thermogravimetric studies; x-ray diffraction, photoconductivity, Raman spectroscopic, Seebeck and photoelectrochemical cell measurements at lower temperatures were used to characterize the point defects and their role in the photolysis of water.

19917 **(PB—82-231671) Basic research opportunities for lasting fuel gas supplies from inorganic resources. Final report 15 Feb 81-28 Feb 82.** (Texas Engineering Experiment Station, College Station (USA)). Feb 1982. 335p. NTIS, PC A15/MF A01.

Twenty-six participants (twenty-five faculty members from U.S. universities and one private consultant) reviewed the status of current research problems relating to the production of fuel gases from inorganic resources using indefinitely sustainable energy sources during a workshop held during the period June 8 to August 14, 1981 at Texas AandM University, College Station, Texas. Photobiological, biomimetic, photochemical, photoelectrochemical, radiolytic and thermochemical pathways leading to the generation of hydrogen from water and hydrogen sulfide, of carbon monoxide and methane from carbon dioxide, and of nitrogen-based fuel gases from atmospheric nitrogen were assessed. The most likely energy sources to drive the endergonic, fuel-producing reactions are solar radiation, and heat and radiation from nuclear reactors. Recommendations at the end of each chapter outline the basic research needed to improve the fuel gas-producing reactions and to provide the basis for developments leading to the practical application of these processes. It was suggested that equal emphasis should be placed on research in photobiology, biomimetic chemistry, photochemistry and photoelectrochemistry pertinent to fuel-gas production. Thermochemical and radiolytic methods appear to deserve less attention at the present time. The report contains 840 literature citations.

19918 **(PB—82-232786) Use of immobilized hydrogenase for hydrogen production- final report.** Durand, G.; Hatchikian, C.; LeGall, J.; Monsan, P. (Commission of the European Communities, Luxembourg). [nd]. 47p. NTIS, PC AE03/MF E03.

Hydrogen production at the rate of 0.1 liter hydrogen gas per minute per gram support has been achieved at 37C with an immobilized hydrogenase isolated from Desulfovibrio gigas. The ability of immobilized hydrogenase to evolve hydrogen when coupled to illuminated chloroplasts has been demonstrated, and work is in progress to optimize the method of coupling.

19919 **(SERI/CP—231-1873) Photo/biological hydrogen program progress reports.** (Solar Energy Research Inst., Golden, CO (USA)). Dec 1982. Contract AC02-77CH00178. 163p. (CONF-820676—). NTIS, PC A08/MF A01. Order Number DE83005811.

From SERI biomass program principal investigators review meeting; Washington, DC, USA (23 Jun 1982).

Individual progress reports are abstracted for inclusion in the Energy Data Base.

19920 (SERI/CP—231-1873, pp 5-17) **Oxygen-evolution patterns from oxygen-evolving photosystem II particles.** Seibert, M.; Lavore, J. (Solar Energy Research Inst., Golden, CO). Dec 1982. NTIS, PC A08/MF A01. Contract AC02-77CH00178.

From SERI biomass program principal investigators review meeting; Washington, DC, USA (23 Jun 1982).

Recent investigations of the oxygen-enzyme system (OES) or the algal/higher plant water-splitting apparatus are reported. This apparatus represents a neglected area of research on the oxidizing side of green plant photosynthesis. Procedures yielding Photosystem II (PSII) preparations containing an active, water-splitting enzyme have been reported. New patterns of oxygen evolution resulting from sequences of short, single-turnover flashes on three types of PSII-OES samples are reported. The results are, in general, consistent with the S-state model developed to explain O_2 evolution in algae and chloroplasts, but several anomalies have been observed.

19921 (SERI/CP—231-1873, pp 19-32) **Enhancement of H_2 production by photosynthetic bacteria.** Weaver, P.F.; Schlutz, J.S.; Maness, P.C. (Solar Energy Research Inst., Golden, CO). Dec 1982. NTIS, PC A08/MF A01.

From SERI biomass program principal investigators review meeting; Washington, DC, USA (23 Jun 1982).

Under appropriate conditions anaerobically in the dark several species of photosynthetic bacteria generate energy either by fermentation of sugars (and endogenous polysaccharide) or by the anaerobic oxidation of nonfermentable substrates coupled to the reduction of nitrate, nitrite, dimethylsulfoxide (DMSO), or trimethylamine oxide (TMAO). From molar growth yields and carbon balance determinations we can estimate that nitrate is about 89% as efficient as O_2 in generating electron transport linked phosphorylation. DMSO and TMAO are 33% to 41% as efficient as O_2. Since most strains exhibit nitrogen fixation under dark fermentative growth conditions, it can be calculated that about 4 ATP are expended for each electron pair transferred to nitrogenase. Hydrogen production occurs in the dark at rates of about 36 ml H_2 g dry wt^{-1} hr^{-1}. The rates are unaffected by ammonia, thereby indicating its source to be from hydrogenase under these conditions. The activity saturates at about 0.2 atm H_2 pressure. Rhodopseudomonas sphaeroides SCJ incubated in the light under nitrogen-limiting conditions is capable of producing self-generated gas pressures of at least 50 atm, attributable primarily to H_2. Ammonia-sensitive, H_2 photoproduction rates are 168 ml H_2 g dry wt^{-1} hr^{-1} in saturating light. With light intensities from 20 to 190 W/m^2, 4.8 to 5.7% of the incident radiant energy can be recovered as combustible energy of the H_2 produced. Hydrogen production rates are independent of substrate concentrations from about 1 to 70 mM. About 20 biomass substrates have been identified as potentially suitable as photoconversion substrates. These include thin stillage from alcohol distilleries, spent beers, and numerous fruit and vegetable processing wastes provided that they are previously fermented.

19922 (SERI/CP—231-1873, pp 33-41) **Studies on algal hydrogenase and hydrogen metabolism.** Lien, S. (Solar Energy Research Inst., Golden, CO). Dec 1982. NTIS, PC A08/MF A01.

From SERI biomass program principal investigators review meeting; Washington, DC, USA (23 Jun 1982).

The primary objective of this project is to obtain fundamental information on hydrogenase and the associated hydrogen producing and utlizing metabolisms in eukaryotic microalgae so that effective biochemical and/or genetic manipulative techniques can be devised to: (1) modify or decrease the O_2-sensitivity of the algal hydrogenase; and (2) to direct a larger fraction of photosynthetic reductants toward hydrogenase to ensure higher rate of H_2 production by algal cells. Some aspects of the major technical progress accomplished to date are summarized.

19923 (SERI/CP—231-1873, pp 43-58) **Study of hydrogen production by tropical marine photosynthetic bacteria for applied systems: the second year study.** Mitsui, A.; Matsunaga, T.; Kumazawa, S. (Univ. of Miami, FL). Dec 1982. NTIS, PC A08/MF A01.

From SERI biomass program principal investigators review meeting; Washington, DC, USA (23 Jun 1982).

The marine photosynthetic bacteria Miami PBE 2271, isolated from the surface of the sea grass Thalassia in the subtropical marine environment, was studied for hydrogen production. It was grown on molecular nitrogen as the sole source of nitrogen. High rates of hydrogen production were observed at seawater salinities. Hydrogen production was completely light dependent. Under optimum conditions, this strain produced hydrogen from malate at rates as high as 8 μ mole/mg protein/h. Carbohydrates and organic acids were used as substrates for hydrogen production. It was also shown that blue-green algal biomass could be utilized as a substrate for hydrogen production, after acid or alkaline digestion. Strain PBE 2271 was also immobilized on agarose-coated polyester films in order to enhance and stabilize hydrogen photoproduction. Filtered seawater was used as the suspending medium. Hydrogen production was observed over a wide range of salinities (5 to 100%). Inhibitory effects of oxygen and nitrogen on hydrogen production were substantially reduced by immobilization. In addition, storage stability and duration of hydrogen production were improved by immobilization. Rates as high as 180 μ moles of hydrogen/mg Chl./hr. were observed. Hydrogen production was observed over a 20-day period without any reduction of the rate. Apart from the study with PBE 2271, bioenergetic properties of hydrogenase in PBS 1071 were investigated. This Chromatium strain produces hydrogen at high rates (6 μ moles/mg protein/hr) via a nitrogenase-mediated reaction. Hydrogenase-mediated oxygen-dependent hydrogen uptake activity was also observed.

19924 (SERI/CP—231-1873, pp 59-72) **Photoproduction of H_2 from cellulose by an anaerobic bacterial coculture.** Odom, J.M.; Wall, J.D. (Univ. of Missouri, Columbia). Dec 1982. NTIS, PC A08/MF A01/.

From SERI biomass program principal investigators review meeting; Washington, DC, USA (23 Jun 1982).

The photosynthetic diazotroph, Rhodopseudomonas capsulata is a metabolically versatile microorganism. Although R. capsulata grows on cellobiose, the organism does not utilize cellulose. One approach to coupling cellulose utilization to the photoproduction of hydrogen was to establish a nutritionally simple, facultatively anaerobic coculture catalyzing a light dependent food chain from cellulose to molecular hydrogen. Cellulomonas sp. was chosen as the cellulolytic organism due to its facultatively anaerobic metabolism, simple nutrition and organic acid production during sugar fermentation without the evolution of gas. As a result of this choice, organic acids rather than sugars would function as the substrates for the phototroph and the fermentation would not be limited by the accumulation of hydrogen as has been observed in other organisms where hydrogen is a fermentation product. As the hydrogen producing organism, R. capsulata wild type, or a mutant lacking the uptake hydrogenase, was employed in the coculture. Cocultures of these microorganisms were shown to degrade cellulose and to produce either large amounts of hydrogen or cell protein depending on the ammonium concentration.

19925 (SERI/CP—231-1873, pp 73-82) **Biochemical genetics and regulation of hydrogenase in Escherichia coli and Anabaena variabilis.** Spiller, H.; Patel, P.; Shanmugam, K.T. (Univ. of Florida, Gainesville). Dec 1982. NTIS, PC A08/MF A01/.

From SERI biomass program principal investigators review meeting; Washington, DC, USA (23 Jun 1982).

The main aim of our work is to isolate mutants of blue-green alga, Anabaena variabilis that are defective in hydrogen uptake and also to maximize H_2 production by the organism by eliminating rate-limiting steps, if any, in H_2 production. As a first step towards this goal, we have attempted to understand the basic physiology of H_2 production by this organism. It is generally accepted that the heterocysts, the differentiated cells containing nitrogenase, also contain hydrogenase and this hydrogenase is responsible for the H_2 uptake. However, several reports exist in the literature pointing to the fact that the vegetative cells also contain a hydrogenase activity, and this hydrogenase activity is believed to be reversible. Although a reversible hydrogenase, capable of catalysing H_2 evolution from reduced methyl viologen has been detected in the vegetative cells of heterocystous blue-green algae this activity is generally very low. This low activity led Bothe and his coworkers to suggest that this H_2 evolution is actually catalysed by the H_2 uptake hydrogenase. One of the major questions we are attempting to answer at the present time is the presence and nature of two hydrogenases. Are there two distinct hydrogenase proteins and thus two genes coding for each hydrogenase separately or one hydrogenase which under different conditions produces different activities. Understanding this particular aspect would be of immense help in isolating mutants defective in hydrogenase and H_2 uptake and this requires a good understanding of the physiology and biochemistry of the hydrogenase in A. variabilis.

19926 (SERI/CP—231-1873, pp 99-122) **Biochemical approach to solar hydrogen production.** Olson, J.M.; Bernstein, J.D. (Brookhaven National Lab., Upton, NY). Dec 1982. NTIS, PC A08/MF A01/.

From SERI biomass program principal investigators review meeting; Washington, DC, USA (23 Jun 1982).

The research can be divided conveniently into four stages. In the present stage PS-I and PS-II vesicles have been made from natural sources (e.g. green photosynthetic bacteria, blue-green algae, and chloroplasts) and tested for the ability under appropriate conditions to produce either hydrogen or oxygen. In the second stage reaction centers and even entire photosynthetic units will be isolated from natural sources and incorporated in artificial vesicles. In the third stage the goal should be synthetic reaction centers and synthetic pigments in synthetic vesicles. Concurrent research and development of a synthetic barrier membrane will be required to satisfy the stringent requirements of a workable photohydrogen generator.

19927 **Effect of surface roughness on the hydrogen evolution reaction kinetics with mild steel and nickel cathodes.** Brown, A.P.; Krumpelt, M.; Loutfy, R.O.; Yao, N.P. (Argonne Natl Lab, IL, USA). *Electrochimica Acta;* 27: No. 5, 557-560(May 1982).

The effect of electrode surface roughness on the kinetics of the hydrogen evolution reaction has been studied for mild steel and nickel cathodes in 10 M NaOH at 348/degree/K. With the nickel cathodes, the Tafel slope was independent of whether the electrode surface was smooth or roughened, but the exchange current density was about twice that for the roughened electrode. With the mild steel cathodes, the roughened electrode showed a considerably lower Tafel slope than the smooth electrode with b?51 mV for the rough electrode and b?110 mV for the smooth one. The exchange current density was also lower for the roughened mild steel cathode than for the smooth electrode: 1.0*10/sup -5/ A/cm/sup 2/ vs 2.3*10/sup -5/ A/cm/sup 2/. 20 refs.

19928 **Investigation of the potential of polymer-bound coordination compounds as catalysts for the photolytic production of hydrogen from water.** Kelly, J.M.; Clear, J.M.; Grayson, D.H.; Johnston, D.S.; Pepper, D.C.; Vos, J.G. Luxembourg; Commission of the European Communities (1981). 54p. (EUR—7593-EN). .

Organic polymers containing polymer-bound complexes of the type $[Ru(bpy)_2(PVP)X]$sup(n+) (n = 1, X = Cl; n = 2, X = CO, py, H_2O, PVP) have been prepared. Synthetic routes proceed either from preformed polymer and $Ru(bpy)_2Cl_2$ or $[Ru(bpy)_2(OH_2)_2]^{2+}$ or via polymerisation of the corresponding monomer complex. The dependence of the chemical and physical properties on the nature of the polymer backbone and on the loading of the metal complex on the polymer (the Ru:PVP) ratio has been studied.

0802 Storage

REFER ALSO TO CITATION(S) 21119

19929 **(CONF-810497—(Absts.)) Miami international symposium on metal-hydrogen systems.** Vezirogelu, T.N. (Miami Univ., Coral Gables, FL (USA). Clean Energy Research Inst.). 1981. 207p. Univ. of Miami, Clean Energy Research Inst., P.O. Box 248294, Coral Gables, FL 33124 $35.00.

From International symposium on metal-hydrogen systems; Miami Beach, FL, USA (13 Apr 1981).

Papers were presented at the following sessions: hydride formation; diffusion of H_2 in metals; hydride utilization; embrittlement; hydride storage; interaction of H_2 with structure; and hydride properties. The proceedings contain extended abstracts of the papers.

19930 **Solid state hydrogen pumping and storage material.** Forester, D.W.; Lubitz, P.; Vittoria, C. US Patent Application 6-386 465. 9 Jun 1982. 11p.

An object of the present invention is to provide a solid-state hydrogen storage material that does not require high pressure for efficient absorption or high temperature for efficient discharge. A further object of the present invention is to provide a solid-state hydrogen material that is not impaired by atmospheric exposure and that does not discharge hydrogen at room temperature.

0804 Marketing And Economics

19931 **(EUR—7980-EN) Energy LP modelling prospects for NDF hydrogen. Final report.** Clifford, J.S.; Laughton, M.A.; McRoberts, T.S.; Slee, P.V. (Queen Mary Coll. Industrial Research Ltd., London (UK)). 1982. 98p. European Community Information Service, 2100 M Street NW, Suite 707, Washington, DC 20037.

An 8-nation, 5-period model constructed to investigate the potential role of Non-Fossil-Derived Hydrogen (NFDH) processes in the future of the European Community energy supply, showed: significant rise in imported coal use; the depletion to zero of all indigenous oil and gas reserves; the phasing out of imported oil and gas by means of cheaper oil and gas derived from coal conversion in the latter decades of the period studied; penetration of market is insensitive to projected oil prices; the competition of relative costs of nuclear electricity and coal; critical electricity-to-coal price ratio boundaries separating out the three regions for NFDH operation; and interdependence between electricity generation and coal conversion wheree the latter depends on nuclear electricity being available at marginal cost. Joint ventures between disparate industries such as the coal and lectricity industries may create institutional and accountancy problems.

0806 Industrial And Commercial Use

REFER ALSO TO CITATION(S) 19929

0808 Properties

REFER ALSO TO CITATION(S) 19773, 19929, 21302

09 OTHER SYNTHETIC AND NATURAL FUELS

0901 Hydrocarbon Fuels

REFER ALSO TO CITATION(S) 19406, 19489, 19490, 19491, 19492, 19493, 19494, 19495, 19496, 19497, 19498, 19499, 19500, 19501, 19502, 19503, 19504, 19505, 19506, 19507, 19508, 19509, 19510, 19511, 19512, 19535, 19549, 19550, 19551, 19552, 19748, 19770, 19771, 19773, 19957, 20003, 20019, 20997, 20998, 20999, 21002, 21069, 21196, 21250, 21296, 21302, 21924, 21925

19932 **(DOE/ER/10625—T1) Homogeneous carbon monoxide fixation. Progress report, May 1, 1980-March 1, 1982. Final rport.** Cutler, A.R. (Wesleyan Univ., Middletown, CT (USA)). Mar 1982. Contract AC02-80ER10625. 26p. NTIS, PC A03/MF A01. Order Number DE83002267.

The research program is divided into two parts: selective conversion of two CO ligands on Cp $Fe(CO)_3^+$ to C_2 organic compounds, and bimetallic activation of coordinated ligands. (DLC)

19933 **(DOE/PC/30021—T11) Catalyst and reactor development for a liquid-phase Fischer-Tropsch process. Quarterly technical progress report, 1 July 1982-30 September 1982.** Dyer, P.N.; Pierantozzi, R.; Brian, B.W.; Bauer, J.V.; Parsons, R.L. (Air Products and Chemicals, Inc., Allentown, PA (USA)). Nov 1982. Contract AC22-80PC30021. 36p. NTIS, PC A03/MF A01. Order Number DE83005595.

Two major tasks were current in the eighth quarter: (1) Slurry Catalyst Development; and (2) Slurry Reactor Design Studies. Parametric gas phase screening of supported conventional catalysts continued, enabling the optimum for diesel range product to be chosen for slurry testing. Seven supported molecular clusters were tested in the slurry phase. One gave results similar to a previous screening test; a high 1-alkene content and small Schulz-Flory deviations in the $C_{10}+$ range, but with a cut off at ~ C_{28}. The slurry test of another cluster catalyst showed a high bulk activity, with conversion levels four times higher than the baseline catalyst, and deviations from the Schulz-Flory limitation that increased with time. Up to 55.1 wt % C_{10}-C_{20} was produced with a low 5.7 wt % CH_4 yield. The results demonstrate potential for a good diesel fuel catalyst. Shakedown runs and initial gas holdup determinations were completed for the 12" column, and a statistical experimental design was produced to maximize the information gained from this program. The use of a hot-film anemometer probe to measure bubble diameter in the three phase systems was successfully demonstrated, and programing to interpret the data was begun. Viscosity measurements for hydrocarbon slurries showed non-Newtonian behavior, and are expected to result in a significant correlation parameter. 10 figures, 4 tables.

19934 (DOE/PC/40276—T1) Spray combustion of synthetic fuels. Phase II. Spray-combustion phenomena. First quarterly report, 1 October 1981-1 January 1982. (Science Applications, Inc., Chatsworth, CA (USA). Combustion Science and Advanced Technology Dept.). 28 Jan 1982. Contract AC22-81PC40276. 150p. NTIS, PC A07/MF A01. Order Number DE82010209.

The objectives of this project are to augment existing information on physical and chemical processes relevant to synfuel combustion; to develop fundamental information and data bases applicable to synfuel utilization in industrial combustors; and to develop associated combustion models and synfuel utilization criteria with special emphasis on spray combustion. During the first quarter of the program progress in each of the active tasks includes work performed on Tasks 1, 2.1, 3, 4.1 and 5. Work on Task 1 was devoted to the identification ad collection of available synfuel properties relevant to spray combustion phenomena. Emphasis was on the physical and chemical properties of SRC-II middle and heavy distillates and the baseline No. 2 fuel oil. Effort on Task 2.1 was devoted to the delineation of required extensions of the existing quasiglobal kinetics models for application to the analysis of the oxidation process of Baseline No. 2 fuel oil and SRC-II middle distillate. In addition, sources of data relevant to the implementation of these extensions have been identified. Work on Task 3.1 emphasized both the formulation and the initiation of the development of the submodel elements needed for analysis of experimental data and spray combustion predictions. These model developments include: (1) laminar flat flame analysis; and combustion models; (4) spray trajectory model. Work under task 3.2 emphasized the submodel development for the dense spray processes relevant to the near field of the spray injection process. Task 4.1 was devoted to the design of the cold flow hardware to be used for flowfield and spray dynamics characterization. Work under Task 5 was on the development of the overall modular spray combustion model including the formulation and application of supporting analysis.

19935 (N—8228485) Fire extinguishing tests -80 with methyl alcohol gasoline. Holmstedt, G.; Ryderman, A.; Carlsson, B.; Lennmalm, B. (Statens Provningsanstalt, Boraes (Sweden)). 1980. 121p. (MIXED). (SP-RAPP—1981:20). NTIS, PC A06/MF A01.

Large scale tests and laboratory experiments were carried out for estimating the extinguishing effectiveness of three alcohol resistant aqueous film forming foams (AFFF), two alcohol resistant fluoroprotein foams and two detergent foams in various poolfires: gasoline, isopropyl alcohol, acetone, methyl-ethyl ketone, methyl alcohol and M15 (a gasoline, methyl alcohol, isobutene mixture). The scaling down of large scale tests for developing a reliable laboratory method was especially examined. The tests were performed with semidirect foam application, in pools of 50, 11, 4, 0.6, and 0.25 sq m. Burning time, temperature distribution in the liquid, and thermal radiation were determined. An M15 fire can be extinguished with a detergent foam, but it is impossible to extinguish fires in polar solvents, such as methyl alcohol, acetone, and isopropyl alcohol with detergent foams, AFFF give the best results, and performances with small pools can hardly be correlated with results from large scale fires.

19936 (PB—83-111088) Gobar gas plant - a study. Mukherjee, K.K. (Gandhi Peace Foundation, New Delhi (India)). May 1974. 23p. NTIS, PC A02/MF A01.

The Gobar Gas Plant has drawn the attention of the government and the people in the context of the countrywide scarcity of fuel and manure. The gas plants of the Sevapuri block, Varanasi, U.P., have been taken into consideration for the purposes of the study. This study was undertaken with a view to knowing the working and functioning of the gas plants in respect of their size, cattle requirement, maintenance, gas formation and consumption, seasonal variation in gas formation, benefits, cost benefit ratio and their problems, and also to know the owners - their socio-economic background, acceptance, and motivation. The importance of the study is that it will help both the government and the people to know in detail the working and functioning of the gas plants and their respective owners.

19937 (SERI/CP—230-1797) Fuel-gas production from animal and agricultural residues and biomass. Anaerobic Digestion Program. (Solar Energy Research Inst., Golden, CO (USA)). Dec 1982. Contract AC02-77CH00178. 132p. (CONF-820676—Vol.2). NTIS, PC A07/MF A01. Order Number DE83005106.

From SERI biomass program principal investigators review meeting; Washington, DC, USA (23 Jun 1982).

The papers presented at this conference dealt with the genetics and metabolic requirements and processes of methanogenic bacteria; the autohydrolysis of cellulose as a pretreatment to increase biodegradability to methane; biochemical reaction kinetics of anaerobic digestion; the economics of biomass conversion plants; and the use of methane in the cogeneration of electricity and hot water. Separate abstracts were prepared for the seven papers presented at the conference. (CKK)

19938 (SERI/CP—230-1797, pp 53-65) **Autohydrolysis of organic residue to increase biodegradability to methane.** McCarty, P.L.; Young, L.Y.; Colberg, P.J.; Baugh, K.; Bachmann, A.; Beard, V.; Heim, D. (Stanford Univ., CA). Dec 1982. NTIS, PC A07/MF A01.

From SERI biomass program principal investigators review meeting; Washington, DC, USA (23 Jun 1982).

The objective of this study is to evaluate thermochemical pretreatment as a method for increasing the anaerobic biodegradability of organic materials so that they can be more completely fermented to methane gas. The study has five phases: semi-continuous autohydrolysis system operation; autohydrolysis process optimization; anaerobic treatment optimization; autohydrolysis of agricultural residues; and biodegradation of lignin and lignin fractions. The system being constructed under phase one, involving the autohydrolysis of softwood and the fermentation of the resulting soluble product to methane, will treat about six liters/day of autohydrolysis liquid. The work under phase two has been to determine treatment conditions that maximize solubilization of forest product carbohydrates while minimizing their decomposition to refractory compounds. A high performance liquid chromatography system is described which quantifies the products formed during autohydrolysis. Under phase three digesters were evaluated and a new reactor was developed. Previous studies have shown that autohydrolysis of agricultural residue tends to make them less biodegradable because a portion of the material is made refractory. Under phase four autohydrolysis will be applied to the lignocellulosic residue remaining after initial anaerobic digestion of agricultural materials. Preliminary results have been previously reported; the studies have been extended; but no new results are available. Phase five studies are nearly complete on the biodegradation of lignin, and results will be reported in the next progress report. (CKK)

19939 (SERI/CP—230-1797, pp 67-87) **Biochemical studies on the metabolic requirements of methanogenic bacteria and fatty acid utilizers as an approach to increasing the rate and yield of methanogenesis.** LeGall, J.; Ljungdahl, P.O. (Univ. of Georgia, Athens). Dec 1982. NTIS, PC A07/MF A01.

From SERI biomass program principal investigators review meeting; Washington, DC, USA (23 Jun 1982).

The fermentation of cellulose to methane is a complex anaerobic process involving a number of different physiological types of microorganisms. Using sulfate reducing and methanogenic bacteria as a model it is possible to describe the regulatory mechanisms involved on a molecular basis during both the oxidation of organic acids (produced from the breakdown of large polymers, e.g. cellulose) to molecular hydrogen and the reduction of carbon dioxide to methane by hydrogen. It is clear that a thorough understanding of the structure and function of redox proteins associated with these types of organisms is necessary when optimizing the rate and yield of methane production within digestors. The studies of redox proteins have pointed out the importance of certain nutrients in the metabolism of both organic acid oxidizing and methanogenic bacteria. Results are reported on the role played by cobalt, nickel, sulfur, and inorganic pyrophosphate in the conversion of biomass to methane. The direction of future studies is described.

19940 (SERI/CP—230-1797, pp 89-103) **Continuous culture biomass fermentation studies. Quarterly report.** Gaddy, J.L.; Clausen, E.C. (Univ. of Arkansas, Fayetteville). Dec 1982. NTIS, PC A07/MF A01.

From SERI biomass program principal investigators review meeting; Washington, DC, USA (23 Jun 1982).

Anaerobic digestion can be carried out in either batch or continuous culture reactors. The batch reactor is best suited to the smaller farm-scale system, since it requires less attention and offers less opportunity for exposure to oxygen. Most large-scale chemical processes use continuous reactors, primarily because of a lower labor requirement, smaller equipment, or better quality control. Continuous reactors offer additional advantages in anaerobic digestion. A constant gas output can be achieved, and better kinetics and smaller reactors usually result. Problems with maintaining viable cultures are reduced since frequent start-up is not required. The purpose of this study is to investigate ways of improving the kinetics of producing methane by anaerobic digestion of agricultural residues in continuous culture. The current status of anaerobic digestion kinetic measurements and reactor design are analyzed. Utilizing the kinetic model, a preliminary process design and economic analysis is presented for the industrial process and parameters affecting the economics of methane production are discussed.

19941 (SERI/CP—230-1797, pp 105-111) **Anaerobic fermentation of beef-cattle manure and crop residues.** Hashimoto, A.G.; Hruska, R.L. (Agriculture Research Service, Clay Center, NE). Dec 1982. NTIS, PC A07/MF A01.

From SERI biomass program principal investigators review meeting; Washington, DC, USA (23 Jun 1982).

The overall objective of this study is to assess the technical and economic feasibility of producing methane through anaerobic digestion of manure and crop residue mixtures and to develop optimum systems compatible with livestock production enterprises. This paper summarizes the results of the two year study using both laboratory scale and pilot plant scale fermentors. Evaluated were the following: a pilot-scale two-stage fermentation system designed to accommodate manure-straw mixtures; the effect of mixing a highly carbonaceous substrate (molasses) with a highly nitrogenous substrate (cattle manure) on CH_4 production; the effects of temperature, pH, substrate concentration, and alkaline pretreatment on the rate and extent of hydrolysis of manure-straw mixtures; the effect of temperature and concentration of straw in manure-straw mixtures on CH_4 production; the effect of mixing duration and vacuum on CH_4 production rates; and the effects of temperature, volatile solid concentration, and hydraulic retention time on CH_4 production. (CKK)

19942 (SERI/CP—230-1797, pp 113-116) **Low cost approach to methane generation, storage and utilization from crop and animal residues. Informal progress report, January 1, 1982-June 30, 1982.** Jewell, W.J. (Cornell Univ., Ithaca, NY). Dec 1982. NTIS, PC A07/MF A01.

From SERI biomass program principal investigators review meeting; Washington, DC, USA (23 Jun 1982).

This paper describes the objectives, status, and future activities of a project for the development of dry fermentation for crop residue methane production and for the operation of two full scale dairy fermentors emphasizing alternative methods of biogas handling, storage, and cogeneration of electricity and hot water. (CKK)

19943 **Sulfur deactivation of nickel methanation catalysts.** Fitzharris, W.D.; Katzer, J.R.; Manogue, W.H. (Univ. of Delaware, Newark). *Journal of Catalysis;* 76: No. 2, 369-384(Aug 1982).

Sulfur deactivation of supported Ni in CO hydrogenation was studied in an all-quartz internal-recycle reactor with a feed containing 4% CO in H_2. Thirteen ppB H_2S reduced the steady-state methanation activity of $Ni/\gamma\text{-}Al_2O_3$ about 200-fold at 661 K; 100 ppB H_2S reduced the activity 5000-fold. A dual site Langmuir-Hinshelwood rate expression predicts both the CO partial pressure dependence and the S poisoning. Poisoning and chemisorption data indicate formation of a stable two-dimensional surface sulfide with a S:Ni surface atom ratio of 1:2 for 13 ppB H_2S in H_2 at 661 K. The surface sulfide has a free energy of formation of at least -26 kcal/mole which is 15 kcal/mole more stable than bulk Ni_3S_2. Sulfur poisoning is due to geometric effects, i.e., site blockage, rather than electronic effects since the activation energy for methanation over S-poisoned Ni was the same as that over unpoisoned Ni, 24 kcal/mole.

19944 **Conversion of tannery waste to useful products.** Muralidhara, H.S.; Maggin, B.; Phipps, H. (Battelle, Columbus, OH 43201, USA; Arthur D Little, Inc, Washington, DC 20006, USA; Economics and Energy Resources, Inc, Washington DC 20012, USA). *Resources and Conservation;* 8: No. 1, 43-59(Mar 1982).

The purpose of this study was to evaluate the technical performance and cost effectiveness of a low temperature pyrolysis process which uses dry leather tanning wastes to provide energy and chrome tanning liquor for reuse in tanneries. Presently, leather waste is disposed of in landfills, resulting not only in a considerable loss of potential energy (estimated to be 633 TJ annually), but an even more significant loss of chromium (estimated to be 8.2 Gg annually). The pyrolysis process is shown to be technically feasible, economically viable, and can alleviate a leather waste management problem that is becoming increasingly more difficult to handle because of more stringent environmental chrome waste disposal requirements. Tanneries can save an estimated $7 million to $8 million annually by employing this pyrolysis process to conserve energy and chrome in dry tanning wastes. (Refs. 10).

0902 Alcohol Fuels

REFER ALSO TO CITATION(S) 19408, 19414, 19489, 19490, 19491, 19492, 19493, 19494, 19495, 19496, 19497, 19498, 19499, 19500, 19501, 19502, 19503, 19504, 19505, 19506, 19507, 19508, 19509, 19510, 19511, 19512, 19535, 19541, 19549, 19550, 19551, 19552, 19784, 19935, 19986, 19989, 19990, 19991, 19992, 20013, 20016, 20021, 20022, 20023, 20028, 20088, 21002, 21251

19945 **(AD-A—120109/4) Assessment/review of methanol technology and utilization as a fuel. Interim report Oct 81-Sep 82.** Lee, G.H.; Stavinoha, L.L.; Zoschak, R.G. (Southwest Research Inst., San Antonio, TX (USA). Army Fuels and Lubricants Research Lab.). Jul 1982. 78p. NTIS, PC A05/MF A01.

Alcohols, in particular methanol and ethanol, are currently being extensively studied for feasibility of use as neat fuels, fuel extenders, and/or octane improvers. This report provides a review of methanol technology and a preliminary assessment of its potential for use as a mobility/stationary equipment fuel. A high degree of technical feasibility has been indicated for both increased methanol production and use as a fuel, principally in burners, turbines, and spark ignition engines. Generally, the methanol fuel of choice for direct utilization is not neat methanol, but a methanol fuel containing materials such as isopentane or gasoline (up to 10 vol%) to improve cold start, volatility, and other fuel properties. Modifications of existing equipment are generally needed for direct use of fuel grade methanol except in fuel cells. Use of methanol at low concentrations as an additive or gasoline extender presents fewer problems of system corrosion and elastomer compatibility. A program to demonstrate the potential for utilization of methanol (both direct and as an extender) in DOD equipment has been recommended. Under this program, the Army would evaluate the equipment performance in various climates, test the equipment reliability/durability, and resolve related support questions on the safe and efficient storage, distribution, and use of methanol fuel.

19946 **(AD-A—120160/7) Evaluation of plasma jet ignition for improved performance of alternate fuels. Final report Feb-Aug 82.** Grant, J.F.; Golenko, Z.; McIlwain, M.E. (Geo-Centers, Inc., Newton Upper Falls, MA (USA)). Aug 1982. 87p. NTIS, PC A05/MF A01.

Alcohols, such as ethanol and methanol, are potential substitutes for gasoline during periods of fuel shortages. The pure alcohols have been reported to cause performance and starting problems when used to fuel internal combustion engines. This study characterized how three modes of ignition, OEM-magneto, high energy conventional spark (CI) and plasma jet ignition (PJI) influenced the engine combustion properties of ethanol, methanol and gasoline-alcohol blends. Specific combustion properties examined in these measurements were burning velocity and lean limit. In addition, the engine performance was determined for 30% alcohol-gasoline containing blends. These engine performance measurements determined brake power, blake specific fuel consumption and brake emissions of carbon monoxide and hydrocarbons. The findings of this study suggest that high energy ignition systems, such as plasma jet ignition, will improve both fuel combustion properties and engine performance.

19947 (DOE/PC/30019—T4) **Liquid-phase-methanol process-development unit: installation, operation, and support studies. Technical progress report No. 5, 1 October 1982-31 December 1982.** (Chem Systems, Inc., Tarrytown, NY (USA)). 20 Jan 1983. Contract AC22-81PC30019. 345p. NTIS, PC A15/MF A01. Order Number DE83005491.

This report covers the fifth period of Contract performance. The overall objective of this program is to demonstrate the technical feasibility of the Liquid Phase Methanol (LPMeOH) process at theProcess Development Unit (PDU) scale of operation. Revision 2 of the LaPorte LPMeOH Process Development Unit (PDU) Engineering Flowsheet was released, incorporating advances made in the engineering design. The APCI Hazards Review team continued assessing risks associated with various process systems, particularly the reactor slurry loop. Process specifications were issued for an iron carbonyl removal system on the basis of a survey of industrial experience and literature related to the subject. The design for a flare system was developed APCI prepared an outline of catalyst reduction procdures, and data was accumulated on properties of circulating oils and slurry. A literature search was completed by CSI for the major topics of interest to the program. In CSI's laboratory, successful testing of in-situ catalyst reduction procedures continued in the CSI Stirred Autoclave Reactors, and two additional commercial catalysts were screened. The Laboratory PDU modifications continue on schedule. Further anlaysis of the 540-hour liquid-fluidized run in the CSI Laboratory PDU was completed. To assist in fundamantal modeling studies, an experimental program to generate bed expansion and gas holdup data in the CSI liquid-fluidized PDU reactor was completed. APCI reviewed chemical equilibrium correlations for the methanol synthesis reaction verified the validity of literature correlations at LPMeOH reaction conditions. The APCI backflow cell reactor computer model, to aid in scale-up of reactor design, was completed and the Continuous stirred Tank Reactor (CSTR) analysis and simulation program was used for determination of kinetics for the LPMeOH process.

19948 (DOE/RA/50362—1395-Vol.1) **Dunn-Nokota Methanol project, Dunn County, North Dakota. Volume I. Executive summary.** (Nokota Co., Bismarck, ND (USA)). 1982. Contract FG01-81RA50362. 178p. NTIS, PC A09/MF A01. Order Number DE83008564.

The Dunn-Nokota Methanol Project is a mine-mouth, coal-to-methanol complex proposed by The Nokota Company for construction and operation in west-central North Dakota in the Fort Union Coal Region at Dunn County, North Dakota. The Project would produce 86,940 barrels per stream day (BPSD) of methanol from 43,156 net short tons per stream day (ST/SD) of run-of-mine (ROM) lignite coal and have an annual capacity of 29.6 million barrels (1.24 billion gallons) of methanol and 14.7 million tons of ROM coal, based on a 93% onstream factor (340 stream days per year). The objectives of the feasibility studies (together with the parallel activities conducted by Nokota) were to produce data and analyses in sufficient detail to support a determination to proceed to final design, financing, and actual construction of the Project. In meeting this goal, the feasibility studies were designed to provide comprehensive data on the Project's technical, economic, regulatory, and marketing feasibility, as well as available financing and product transportation alternatives; and to identify and consider the significant environmental, health, socioeconomic, and safety concerns arising from construction and operation of the Project. The results of the DOE feasibility studies for the Dunn-Nokota Methanol project are contained in an eight-volume Final Report. This report is a compilation of the summaries contained in each of the other volumes of the Final Report.

19949 (DOE/RA/50362—1395-Vol.4) **Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume IV. Product transportation analysis.** (Williams Bros. Engineering Co., Tulsa, OK (USA); Purvin and Gertz, Inc., Dallas, TX (USA)). 1982. Contract FG01-81RA50362. 176p. NTIS, PC A09/MF A01. Order Number DE83008568.

The objective of this portion of the study was to evaluate the technical feasibility of transportation of methanol and by-products to predefined marketing areas by various modes of transportation including pipeline, rail, truck, and water. The study included a review of codes, standards and regulations; product characteristics in relation to transportation, tentative corridor route selections, permitting requirements, use of existing transportation systems, preliminary engineering costs for the pipeline section and transportation costs for available common carrier modes. The market areas considered in this part of the study were established in the Market Analysis Study (Volume III). The primary market area includes North Dakota, South Dakota, Minnesota, Iowa, Wisconsin, Illinois, Indiana, and Michigan. The secondary market area includes Montana, Wyoming, Colorado, Nebraska, Missouri, and Ohio. The West Coast market area consists of California, Oregon, and Washington. The study included investigation of use of existing pipeline systems and tentative selection of routings for eleven system alternatives, in corridors adjacent to existing or proposed pipelines. The eleven alternative pipeline routes are identified in Table 2-1 and include new dedicated systems and use of existing systems by batching. A generalized map showing the geographic relationship of the alternative routes is shown in Figure 2-1 and Figure 2-2 indicates possible terminal locations for the Minneapolis and Chicago areas.

19950 **(PB—82-237041) Source test and evaluation report: alcohol facility for gasohol production. Final reportoct 78-feb 80.** Scarberry, R.M.; Papai, M.P.; Mills, P.E.; Powers, T.J. III. (Radian Corp., McLean, VA (USA)). Apr 1982. 199p. NTIS, PC A09/MF A01.

This study defines the requirements for environmental sampling and analysis of alcohol-producing facilities capable of supporting a Gasohol industry and applies these requirements to the environmental characterization of an alcohol plant. This document includes a conceptual design of a grain alcohol plant using a coal-fired boiler that is projected to be typical of future plants which will support a Gasohol industry. Environmental control options are also discussed based on a comparison of alcohol plant stream compositions with environmental regulations. The results of this study provide preliminary information on the environmental consequences of large-scale fermentation ethanol plants which will provide alcohol for Gasohol.

19951 **(PB—83-118323) Economic balances of small scale ethanol from biomass operations.** Herendeen, R.A.; Reidenbach, D. (Illinois Univ., Urbana (USA). Dept. of Agricultural Economics). Jul 1982. 72p. NTIS, PC A04/MF A01.

The study analyzed the economic viability and operational and marketing conditions of three Midwestern grain-based fuel ethanol plants with production capacity of less than 1.5 million gallons per year. Results on capital costs, operational experiences, and marketing of fuel ethanol and feed byproducts are presented. These plants were found to have many similar characteristics, including low initial capital costs. However, additional capital requirements for the installation of ethanol dehydration equipment presented substantial cash flow problems. Most fuel ethanol plants studied were operating at less than production capacity due to unstable market conditions. The economic feasibility of the grain-based ethanol plants studied was determined to be marginal.

19952 **Alcohol-based fuels from syngases.** Greene, M.I. (Chem Syst Inc, Fairfield, NJ, USA). *Chemical Engineering Progress;* **78**: No. 8, 46-51(Aug 1982).

This paper summarizes results of a research program which was undertaken to find the most advantageous method of using methanol in gasoline blends. It is demonstrated that a mixture called methanol and C_2C_6 saturated alcohols, called Alkanol fuel, has the potential for providing a gasoline-blending stock superior to that of straight-run methanol or ethanol. Extensive property data and test results are tabulated, plotted, and discussed. Economic considerations are included. 4 refs.

19953 **Design for a small-scale fuel alcohol plant.** Berglund, G.R.; Richardson, J.G. (EG and G, Idaho Falls, Idaho, USA). *Chemical Engineering Progress;* **78**: No. 8, 60-67(Aug 1982).

The paper describes the small-scale fuel alcohol plant (SSFAT) which was designed as a small-scale chemical processing plant. The DOE publication, Fuel from Farms, set forth the basic design requirements. To lower operating costs, it was important that all the processes required to produce alcohol were integrated. Automated control was also an important consideration in the design to reduce the number of operators and operator time, thus reducing operating costs. Automated control also provides better quality control of the final product. The plant is presently operating in a test mode to evaluate operating characteristics. The discussion covers the following topics - design requirements; plan operations; fermentation; distillation; microprocessor control; automatic control; operating experience. 1 ref.

0903 Inorganic Hydrogen Compound Fuels

REFER ALSO TO CITATION(S) 19408

0904 Solid Waste And Wood Fuels

19954 **(AD-A—119065/1) Investigation of engineering and design considerations in selecting conveyors for densified refuse-derived fuel (drdf) and drdf: coal mixtures. Final report Jun 80-Sep 81.** Kahn, Z.; Renard, M.L.; Campbell, J. (National Center for Resource Recovery, Inc., Washington, DC (USA)). Aug 1981. 129p. NTIS, PC A07/MF A01.

An engineering evaluation and experimental program involving several types of conveyors applied to blends of densified refuse-derived fuel (dRDF) and blends of dRDF and coal, was conducted by the National Center for Resource Recovery. The final project report discusses the properties of waste affecting convey ability and presents experimentally determined values or observed characteristics. A procedure was selected for the assessment, selection, and operation of belt conveyors based on spillage rate. Corroborating experimental results from a recirculating test rig operated with samples of dRDF and a blend of dRDF and coal over a range of belt configurations, velocities and flow rates were also presented. Experiments conducted on a vibrating pan conveyor over a range of frequencies and stroke length, and on a small apron conveyor, were described and the test results analyzed.

19955 **(AD-A—120113/6) A wood and bark fuel economics computer program (FEP). Forest service research paper.** Harpole, G.B.; Ince, P.J.; Tschernitz, J.L.; Bilek, E. (Forest Products Lab., Madison, WI (USA)). Sep 1982. 14p. NTIS, PC A02/MF A01.

Forest products harvesting and manufacturing processes are expected to provide large and continuing supplies of wood and bark residues. At the same time, the demand for wood residue-type materials for production of wood-fiber based products as well as wood and bark fuels is expected to create competing utilization alternatives. Primary objectives of the fuel economics computer program (FEP) presented here are: (1) to provide a means for assessing the relative energy values of fossil fuels and wood/bark fuels, and (2) to provide pre-engineering assessments of the potential investment that may be justified by benefits gained through modification of systems to burn wood/bark fuels. The FEP computer program utilizes readily available fuel and economics information, standard combustion equations, and discounted cash flow analytic techniques. Because the FEP program is designed for preliminary assessments of wood/bark fuel use opportunities it is suggested that more advanced engineering and financial analytic methods be used for further evaluation whenever favorable venture likelihoods are indicated by the FEP program.

19956 **(DDS—033) Technology and economics of close-coupled gasifiers for retrofitting gas/oil combustion units to biomass feedstock.** Reed, T.B.; Jantzen, D.E.; Corcoran, W.P.; Witholder, R.E. (Solar Energy Research Inst., Golden, CO (USA)). [nd]. 16p. Solar Energy Research Inst., Golden, CO.

From First World Energy Congress, React '78; Atlanta, GA, USA (31 Oct 1978).

Close-coupled air gasifiers can be used to convert existing gas/oil boilers to burn biomass. The gasifiers are relatively simple units operating at 85%-90% thermal efficiency. The gas contains CO, H_2, hydrocarbon gases and vapors with N_2, H_2O, and CO_2 dilutants, and has a heating value of 140-200 Btu/scf when burned hot without scrubbing. Use of this gas in existing boilers may cause 5%-10% derating. Recent tests of a 14 MBtu/hour gasifier coupled to a power boiler in California over a 158 hour period gave satisfactory results with low emissions and only minor technical difficulties. The economics of two gasifiers reported in the literature are analyzed with respect to fuel cost, as a function of capital and operating costs. The gas is estimated to cost $1.40-$2.70/MBtu for biomass feedstocks costing $10-$20/dry ton. The capital costs of retrofitting existing gas/oil boilers are approximately two-thirds the cost of new installations of package wood-fired boilers. Although gasifiers larger than 100 MBtu/hour are not now available, they could probably be used to convert larger field-erected boilers to biomass more economically than construction of new wood-fired boilers. The cost of construction of a new wood-fired package boiler is estimated to be about the same as the cost of a gasifier plus a conventional gas/oil package boiler.

19957 **(PB—82-217621) Regional analysis of potential energy production from agricultural wastes: a technical and economic study. Final report.** Have, H. (Commission of the European Communities, Luxembourg). [nd]. 164p. (EUR—7537-EN). NTIS PC E07/MF E07.

A technical analysis of the possibilities of utilizing agricultural wastes for energy production indicates that direct combustion is the most favorable conversion method for straw and wood, while biological conversion at present is best suited for animal waste. An economic analysis was made, based on cost of collection, storage, transport and conversion of wastes and cost of corresponding oil and oil conversion.

19958 **Overview of R and D programs being coordinated by the inter-governmental wood combustion research group. Paper 81.8.3.** Osborne, M.C. (US EPA, Research Triangle Park, NC, USA). *Proceedings, Annual Meeting, Air Pollution Control Association;* vp(1981). (CONF-810631—).

From 74. annual meeting of the Air Pollution Control Association; Philadelphia, PA, USA (21 Jun 1981).

A study on the emissions from residential wood combustion was conducted. It was found that high concentrations of carbon monoxide and particulate are found in wood smoke but also concluded that socalled polycyclic organic matter (POM) is a more hazardous pollutant which is released from airtight wood stoves. A survey of programs for research of the hazards from air pollutants is given. 6 refs.

13 HYDRO ENERGY

REFER ALSO TO CITATION(S) 20254, 20818, 20819, 20820, 20821, 20823

1301 Resources And Availability

19959 **(AD-A—120049/2) Wynoochee Hydropower/Fish Hatchery: feasibility report and environmental impact statement. Final report.** Waller, J.O. (Corps of Engineers, Seattle, WA (USA). Seattle District). 30 Sep 1982. 574p. NTIS, PC A24/MF A01.

The results of a feasibility study on the desirability of developing the hydropower potential and fish enhancement opportunities at Wynoochee Dam, Washington are presented. The recommended plan is an 11.3 megawatt hydropower addition which would produce an average 36,900 megawatt hours energy per year and a

405,000 - pound hatchery for anadromous fish which would add 127,500 adult fish to the annual harvest. Investment cost would be $43,410,000 (October 1981) of which $23,420,000 is for the hydropower facility and $19,990,000 for the hatchery.

1303 Plant Design And Operation

19960 **(DOE/ID/12122—T1) Small-Scale Hydroelectric Power Demonstration Project. Public Service Company of New Hampshire Drop No. 1 power plant expansion of Garvins Falls hydroelectric plant. Final technical and construction cost report.** (Public Service Co. of New Hampshire, Manchester (USA)). Dec 1982. Contract FC07-80ID12122. 158p. NTIS, PC A08/MF A01. Order Number DE83007221.

This final report discusses the technical, institutional and financial aspects of planning and constructing the Garvins Falls Hydroelectric Redevelopment Project. The Garvins Falls Hydroelectric Station, located on the Merrimack River in Bow, New Hampshire, is part of Public Service Company of New Hampshire's (PSNH) generating system. Realizing the need to reduce its dependence on foreign oil, in order to better serve the energy needs of our customers, PSNH initiated studies to identify viable hydroelectric projects. Garvins Falls was recognized as being one of the potentially better projects because it would utilize an existing dam, and further study indicated that redevelopment of the Garvins Falls site was an economic proposition whose primary benefit would be the potential replacement of energy generated by the use of imported fuel oil with that generated by a renewable source. Therefore, PSNH decided to design and construct the plant. The resulting design proposed expanding the existing project by adding two 2.75 tube-type turbine-generators with a total rated capacity of 6500 kW in a new power plant located in the area of the old powerhouse, necessitating complete demolition and removal of the old powerhouse. Construction of the new project began on August 4, 1980 and both new units were in commercial operation by December 30, 1981. The total cost for the Garvins Falls Hydroelectric Development Expansion Project was $7,946,025, reflecting an installed cost of $1222 per kilowatt. The redeveloped site will generate an estimated average increment in energy of 18,500,000 kWh per year, displacing the use of approximately 33,000 barrels of oil per year and will supply enough electricity to meet the needs of approximately 2600 households.

1304 Regulations And Licensing

REFER ALSO TO CITATION(S) 20835

19961 **(DOE/RA/23220—1) Legislator's guide to small-scale hydroelectric development.** Ferguson, W.R.; Wonstolen, K.A.; Counihan, R.H. (National Conference of State Legislatures, Denver, CO (USA)). Apr 1980. Contract FG03-78RA23220. 61p. NTIS, PC A04/MF A01. Order Number DE83007370.

In accordance with this renewed interest in small-scale hydro, the US Department of Energy (DOE) has established a national small-scale hydro program, including the funding of feasibility studies, demonstration projects and research carried out by federal agencies and other organizations, such as NCSL. This policy guide has been prepared as a preliminary legislative overview of the fundamental problems and possible solutions in developing small-scale hydro at existing dam sites. It is based upon the work of the NCSL Small-Scale Hydroelectric Policy Project, several regional small-scale hydro conferences, and the research efforts of other DOE contractors. State legislatures can provide valuable incentives and alleviate obstacles to small-scale hydro development. The need for well-defined state policies is crucial. The policy areas which warrant the most legislative attention include licensing procedures, taxation, marketing, financing, water rights and environmental regulation. This report describes obstacles, incentives and legislative options in each of the areas listed.

1305 Economics And Management

REFER ALSO TO CITATION(S) 19960, 20835

19962 **(PB—82-208794) Appropriate technology for planning hydroelectic power projects in Nepal: the need for assumption analysis. Technical report.** Chandler, C.G. (Texas Univ., Austin (USA). Center for Research in Water Resources). [nd]. 231p. NTIS, PC A11/MF A01.

This report describes and analyzes planning for hydropower development in Nepal. The objectives of the study are: to conduct an assessment of hydropower project planning in Nepal; to discuss the planning process from the perspective of an engineer seeking to improve it; and to categorize the problems and suggest solutions.

1306 Environmental Aspects

19963 **(FERC/EIS—0036) Black Bear Lake project, FERC No. 5715 - Alaska. Draft Environmental Impact Statement.** (Alaska Power Authority, Anchorage (USA)). Feb 1983. 175p. NTIS, PC A08/MF A01. Order Number DE83007429.

The Alaska Power Authority (Applicant) proposes to construct a hydroelectric project with an installed capacity of 6 MW on black Bear Creek, near the communities of Klawock, Craig, and Hydaburg, on Prince of Wales Island, Alaska. The project would inundate 70 ares of land, when the level of Black Bear Lake is raised to maximum pool elevation, and would consist of: (1) a 53-foot-high, 397-foot-long, concrete gravity dam with an uncontrolled spillway in the center of the dam with a discharge capacity of 1680 cfs; (2) a 4410-foot-long power conduit connectig the intake to the powerhouse; (3) a 226-acre reservoir with a usable storage capacity of 6850 acre-feet at the normal maximum water surface elevation of 1719 feet; (4) a powerhouse, containing two generating units, at elevation 263 feet; (5) a substation next to the powerhouse; (6) 53.2 miles of 34.5-kV and 7.2/12.5-kV transmission lines to the towns of Klawock, Craig, and Hydaburg; (7) a 2-mile-long access road to the powerhouse; and (8) recreation facilities.

14 SOLAR ENERGY

REFER ALSO TO CITATION(S) 21008

19964 **(BEOP—15) Solar energy in the Netherlands. Program of the second phase of the National Research Program on Solar Energy (1982-1985).** (Bureau Energie Onderzoek Projecten, Patten (Netherlands)). Oct 1982. 86p. (In Dutch). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83901338.

The research program on solar energy in the Netherlands second phase for the years 1982-1985 is presented. About 100 projects are included in this program with emphasis on the thermal conversion of solar energy for low caloric applications, e.g. solar space heating with solar boilers and solar roofs. Solar energy combined with heat storage plays also an important role in this program. International cooperation is mentioned.

19965 **(EPRI-AP—2850-SR) Electric-utility solar-energy activities: 1982 survey update. Special report.** Spelman, J.R. (Electric Power Research Inst., Palo Alto, CA (USA)). Dec 1982. 118p. NTIS, PC A06/MF A01. Order Number DE83901447.

The results are presented of a survey to determine the scope of electric utility participation in solar energy projects in the United States. This eighth edition of the survey contains brief descriptions of 128 new projects for 1982 and summarizes significant changes from 1981 in ongoing projects. A total of 930 projects were reported by 235 utility companies. An index of projects by category, a statistical summary, a list of participating utilities with information contacts and addresses, a list of utilities with projects organized by technology, a list of utilities organized by state, and a list of new reports on utility-sponsored projects are included.

19966 (NP—2902727) **Solar industry index. The comprehensive guide to manufacturers and service organizations.** (Solar Energy Industries Association, Washington, DC (USA)). 1977. 388p. Solar Energy Industries Association, 1001 Connecticut Ave., NW, Suite 632, Washington, DC 20036 $8.00.

Manufacturers and service organizations are listed that manufacture products or provide services related to: solar water heating, space heating and cooling and swimming pool heaters; passive systems; installation and maintenance of solar equipment; consulting services; photovoltaic equipment and systems; wind energy systems and products; bioconversion; and solar thermal power generation. Manufacturers provide a general product description, explain the product's purpose, use and application, and performance and experience data. In the case of installation and maintenance contractors and consulting services, the general scope of service, experience in the field and geographical scope of service are given. Alphabetical, geographical, and categorical indices are included. A discussion of the basics and economics of solar energy is included, as well as a member directory of the Solar Energy Industries Association. (LEW)

1401 Resources And Availability

19967 (EUR—7790-EN) **Studies on parameterization of global, diffuse and direct solar radiation.** Kasten, F.; Dehne, K.; Golchert, H.J. (Commission of the European Communities, Luxembourg). 1982. 204p. Available from Commission of the European Communities, Luxembourg.

From 8 stations of the radiation network of Deutscher Wetterdienst, Federal Republic of Germany, the hourly sums of global radiation G measured during 10 year period 1966-1975 were analyzed in terms of monthly cumulative frequency distributions of mean hourly irradiance above given thresholds. From the National Radiation Center Hamburg, additionally the data of diffuse solar radiation D, direct solar radiation I, atmospheric radiation A and several other derived radiation quantities were analyzed in the same way. Furthermore, monthly frequency distributions of global radiation of the 8 stations were established with respect to persistence through given numbers of consecutive hours and consecutive days, respectively, of irradiation above given thresholds.

19968 (EUR—7792-FR) **Final report of the E.C. comparison of the national standard pyrheliometers.** Plazy, J.L. (Commission of the European Communities, Luxembourg). 1982. 18p. (In French). Commission of the European Communities, Luxembourg.

The homogeneity and the treacibility of radiation measurements practiced in the various meteorological networks in the European Countries assumes periodical comparisons between the national standard instruments. According to the Solar Programme of the European Communities a comparison campaign was held in the French radiometric center in Carpentras, from June 13 to 23 1978, with the participation of 15 standard pyrheliometers or absolute radiometers belonging to nine countries, including the World Radiometric Center of Davos. The results show a good accordance between the Angstroem type pyrheliometers within a 0.5% range. It can be deduced a good homogeneity for the network measurements of the solar radiation. The ratio between the International Pyrheliometric Scale of 1956 now in use and the World Radiometric Reference which will be used in 1981 was founded 0.9782. That confirms the results obtained by the World Meteorological Organisation.

19969 (EUR—7951-EN) **Summary report of the CEC-solar radiation data-programme 1975-1979.** Grueber, J.W. (Commission of the European Communities, Luxembourg). 1982. 149p. Available from Commission of the European Communities, Luxembourg.

Project F was established as a service project to support and assist with the data requirements of the other projects within the Solar Energy Programme. The first major task was to devise an action plan based on specific user requirements and by 1 January 1978 the Commission were in a position to award twenty-three contracts to seventeen participating institutions for the period up to 30 June 1979. During the rather short eighteen months period, five important goals were achieved. The preparation and publication of the first volume of the European Solar Radiation Atlas was completed. The improvement and extension of the existing European radiation data network was accomplished. New equipment was installed at a total of 56 stations. An evaluation procedure was selected for calculating the global irradiation of inclined surfaces. This procudure will be used during the second four-year programme for the preparation of volume two of the European Solar Atlas. Test Reference Year (TRYs) data were formed for the purposes of data reduction and subsequent use in computational simulation of solar energy systems. Progress was reported on the development of instrumentation to perform a spectral analysis of solar radiation, and early results from the work on satellite imagery revealed great promise. Much of the methodology devised in the first four-year programme now plays an important and vital role in the present work of Projekt F, in particular the work now being undertaken in the second four-year programme.

19970 (SERI/TR—215-1781) **Beer's-law-based, simple spectral model for direct normal and diffuse horizontal irradiance.** Bird, R.E. (Solar Energy Research Inst., Golden, CO (USA)). Dec 1982. Contract AC02-77CH00178. 41p. NTIS, PC A03/MF A01. Order Number DE83008132.

A spectral model for cloudless days that uses simple mathematical expressions and tabulated look-up tables to generate direct normal and diffuse horizontal irradiance is presented. The model is based on modifications to previously published simple models and comparisons with rigorous radiative transfer codes. This model is expected to be more accurate and to be applicable to a broader range of atmospheric conditions than previous simple models. The prime significance of this model is its simplicity, which allows it to be used on small desk-top computers. The spctrum produced by this model is limited to 0.3 to 4.0 μm wavelength with an approximate resolution of 10 nm.

1403 Economics

REFER ALSO TO CITATION(S) 20046, 20049, 20073

19971 (DOE/AL/19929—T3) **Impediments to capital formation in solar-thermal-energy systems.** Eisner, N.A. (Solar Energy Industries Association, Washington, DC (USA)). Feb 1983. Contract AC04-82AL19929. 45p. NTIS, PC A03/MF A01. Order Number DE83006998.

The current status of the solar thermal industry, the capital allocation process, and actions recommended to attract capital to the solar thermal program are discussed. Emphasis is on the utility market. It is found that the most significant impediment which currently retards capital formation and investment in solar thermal power projects is the economic viability of the projects, measured in terms of both risks and returns, and based on current expectations of future energy prices, inflation, and interest rates. The second is the current tax and regulatory law and the lack of an appropriate match between current incentives and the likely participants in a commercially viable industry. It is concluded that most of the risks must be borne by the public sector. (LEW)

19972 (DOE/JPL—1060-52, pp 295-318) **Potential benefits from a successful solar thermal program.** Terasawa, K.L.; Gates, W.R. (Jet Propulsion Lab., Pasadena, CA). 15 Jul 1982. NTIS, PC A15/MF A01.

From Parabolic dish solar thermal power annual program review; Atlanta, GA, USA (8 Dec 1981).

It is argued that solar thermal energy systems (STES) complement nuclear and coal technologies as a means of reducing the US dependence on imported petroleum. STES can be utilized in a broad range of applications servicing a variety of economic sectors, and they can be deployed in both near-term and long-term markets. Finally, the net present value of the energy cost savings attributable to electric utility and IPH applications of STES were estimated for a variety of future energy cost scenarios and levels of R & D success. This analysis indicated that the expected net benefits of developing an STES option are significantly greater than the expected costs of completing the required R & D. In addition, transportable fuels and chemical feedstocks represent a substantial future potential market for STES. Due to the basic nature of this R & D activity, however, it is currently impossible to estimate the value of STES in these markets. Despite this fact, private investment in STES R & D is not anticipated due to the high level of uncertainty characterizing the expected payoffs, and the non-trivial probability of realizing a large negative rate of return from these investments. Thus, federal participation in STES R & D is required if this valuable solar technology is to be available for deployment during this century.

19973 (DOE/JPL—1060-52, pp 329-338) **Economic evaluation of solar energy.** Wood, D. (Solar Steam, Inc., Fox Island, WA). 15 Jul 1982. NTIS, PC A15/MF A01.

From Parabolic dish solar thermal power annual program review; Atlanta, GA, USA (8 Dec 1981).

If a solar collector collects $1000 worth of energy per year and lasts 20 years it is not worth $20,000. The monetary value of the energy must be discounted to reflect investment alternatives for energy. Energy price changes must also be accounted for. Consumer costs and new energy costs are losing their disparity with the deregulation of energy prices. The solar dish on Fox Island is a model of solar economics. In average US climate the dish will deliver 250 MBTU per year at temperatures up to 750°F. In single present worth terms the dish system cost is about $15,000 (1980$) including maintenance. The system energy value exceeds $30,000. If the money is not discounted then the energy value would exceed $63,000. The dish approach has economic advantages over other generic solar collectors. International consumer interests indicate opportunities for further development and production of solar collecting systems.

19974 (LA-UR—82-2986) **Economic analysis of four passive-cooling strategies for commercial office buildings.** Mangeng, C.A.; Roach, F. (Los Alamos National Lab., NM (USA)). 1982. Contract W-7405-ENG-36. 14p. (CONF-830405—1). NTIS, PC A02/MF A01. Order Number DE83002082.

From 6. annual ASME technical conference on commercial building heating and cooling applications; Orlando, FL, USA (19 Apr 1983).

An economic assessment is presented of four passive-solar-cooling strategies whose performance was simulated in a typical single-story and multi-story office building. Economic performance of each passive-cooling strategy was measured by computing total annual dollar savings in electricity bills, by calculating an investment target from a cash-flow analysis, and by estimating regional and national savings potential assuming universal adoption of the strategy in new office buildings.

1404 Environmental, Legal, And Institutional Aspects

REFER ALSO TO CITATION(S) 20076, 20077

19975 (DOE/JPL—1060-52, pp 201-205) **Commercialization of parabolic dish systems.** Washom, B. (Advanco Corp., El Segundo, CA). 15 Jul 1982. NTIS, PC A15/MF A01.

From Parabolic dish solar thermal power annual program review; Atlanta, GA, USA (8 Dec 1981).

Federal regulatory and tax laws are reviewed and investigated as to where they are leading capital investment in renewable technologies. These laws are specifically: the Public Utility Regulatory Policy Act, the Energy Tax Act, the Economic Recovery Act, and the Energy Recovery Tax Act. An alternative to federal budget outlays for the commercialization of solar energy technologies, particularly the parabolic dish technologies, is found to be creating solar management companies/limited partnerships to take maximum advantage of the existing supply side economic incentives. (LEW)

19976 (PB—82-236969) **(seminario usos de la energia solar en la vivienda) solar energy applications for dwellings. Seminar 17-19 nov 80.** (Secretaria de Asentamientos Humanos y Obras Publicas, Mexico City (Mexico)). Nov 1980. 103p. NTIS, PC A06/MF A01.

Contents include: National Ecoplan; National Urban Development Plan; The National Housing Program and the Use of Solar Systems and not Conventional Energies in Human Settlements; National Infrastructure for the Development of Solar Energy; Plans to Incorporate Solar Energy Systems into Mexican Communities; General Panorama of Solar Energy Projects Being Carried out in Mexico; and Recent Demonstration Projects in Mexico.

1405 Solar Energy Conversion

REFER ALSO TO CITATION(S) 19919, 19920, 19921, 19922, 19923, 19924, 19925, 19926, 19936, 19937, 19938, 19939, 19940, 19941, 19942, 19951, 19953, 19955, 19956, 19957, 19958, 20088, 20814, 20895, 20971, 20997, 20998, 20999, 21002, 21263, 21264, 21266, 21267, 21268, 21269, 21270, 21274, 21902, 21924, 21925

19977 (AD-A—115439/2) **X-ray induced electron emission. Final report.** Aeby, C.A. (Air Force Weapons Lab., Kirtland AFB, NM (USA)). Apr 1982. 206p. (AFWL-TR—81-222). NTIS, PC A10/MF A01.

The development and use of a magnetic spectrograph for the measurement of X-ray induced electron emission is described. Results are presented for metal and dielectric targets ranging in atomic number from Z=6 to Z-82. Materials studied were lead, tantalum, copper, aluminum, magnesium, solar cell cover glass, silica cloth, thermal control paint, Kevlar, Mylar, and conducting/nonconducting epoxy. Direct measurement was made of the quantum yield and energy distribution of electrons emitted at angles of 0 deg, 30 deg, 45 deg and 60 deg with respect to the surface normal of targets exposed to normal incidence filtered and unfiltered 50kV bremsstrah lung X-rays. Experimental results are compared with previous measurements where possible, and with computer code predictions where predictive capability matches the measurement range. The experimental results corroborates the cos theta angular dependence predicted by simple theoretical models, particularly for medium and high Z materials. A trend toward isotropic emission distribution is noted for the lower Z materials. Compared to the measured results, the emission yields predicted by a commonly used analytical model are low by approximately a factor of 2 for the unfiltered X-ray spectrum.

19978 (AD-A—120173/0) **Photoluminescence and electroluminescence as probes of interfacial charge-transfer processes relevant to cadmium sulfo-selenide-based photoelectrochemical cells. Technical report.** Streckert, H.H.; Tong, J.; Carpenter, M.K.; Ellis, A.B. (Wisconsin Univ., Madison (USA). Dept. of Chemistry). 23 Sep 1982. 23p. NTIS, PC A02/MF A01.

Samples of single-crystal, n-type Cd(X)Se(1-X) (where X is = to 1.000, 0.74, 0.49, 0.26, 0.11, 0.00) emit when excited with ultraband gap excitation. The 295 K band gaps monotonicly decrease with X from approx. 2.4 eV for CdS to approx. 1.7 eV for CdSe. Photoluminescence (PL) spectra are sharp and have band positions which vary nearly linearly with composition: lumbda(max) (nm) approximately equal to 718-210 X. The energetic proximity to the band gap, temperature dependence and decay times are all consistent with a description of the PL as edge emission. Measured PL efficiencies, phi(r), are approx. 0.0004 in air. When the samples are used as photoanodes in photo-electrochemical cells (PECs) employing aqueous polysulfide electrolyte, the emission of intensity can be quenched by the passage of photocurrent. The extent of quenching can be correlated with the photocurrent quantum efficiency. Electroluminescence (EL) can be initiated by using the CdS(X)Se(1-X) samples as dark cathodes in aqueous, alkaline, peroxydisulfate electrolyte at potentials cathodic of approx.-0.9 to -1.1V vs. SCE. The EL spectral distribution for a given sample is similar to that observed in PL experiments and indicates that the same emissive excited state is involved.

19979 (AD-A—120244/9) **Photoluminescence and electroluminescence in graded cadmium sulfoselenide electrodes: applications to photoelectrochemical cells. Technical report.** Carpenter, M.K.; Streckert, H.H.; Ellis, A.B. (Wisconsin Univ., Madison (USA). Dept. of Chemistry). 23 Sep 1982. 25p. NTIS, PC A02/MF A01.

Inhomogeneous samples of n-type CdS sub X Se sub 1-x (0 < or = X < or = 1) have been prepared by vapor-phase diffusion of S into a single-crystal CdSe substrate. Characterization of the samples by Auger electron spectroscopy (AES)/Ar ion sputter etching reveals that S has substituted for Se in the lattice to produce a graded region: The depth profile analysis indicates that from a composition with X nearly unity at the surface, X monotonically declines to zero over a distance of about 1 micron. Correspondingly, the band gap diminishes from about 2.4 eV for the CdS-like composition to about 1.7 eV for CdSe. Photoluminescence (PL) and electroluminescence (EL) from the graded material appear to derive from the luminescence of the CdS sub X Se sub 1-x compositions which comprise the graded region: emission from about 500-750 nm matches the spectral region spanned by PL and EL from homogeneous, single-crystal CdS sub X Se sub 1-X samples which emit near their band gap energies. A previously established linear correlation between emission maxima (nm) and composition in homogeneous CdS sub X Se sub 1-X samples provides a spatial probe of election hole(e- - h+) pair recombination in the inhomogeneous material: Regions from which PL and EL originate can be inferred from their spectral distribution in combination with the AES/depth profile data.

19980 **(BMFT-FB-T—81-069) Process development for large-scale production of CdS thin film solar cells sputtered copper sulfide layers and cadmium sulfide-copper sulfide heteorojunctions. Application of high rate sputtering using hot-pressed targets. Final report.** Mueller, W.; Muenz, W.D.; Radler, K.; Schuller, K.H. (Leybold-Heraeus G.m.b.H. und Co. K.G., Hanau (Germany, F.R.)). Apr 1981. 158p. (In several languages). NTIS, PC A08/MF A01.

A method was developed for the manufacturing of stoichiometrically composed copper sulphide-layers and of polycrystalline CdS-layers using a diode sputtering process. Heterojunctions were produced with a Cds-layer-thickness of 6 micrometers and on solar electric efficiency of 1%. High rate sputtering cathodes were developed and their suitfulness, when sputtering CdS, was tested. Using high rate sputtering the sputtering rate of targets with 200 mm diameter could be increased by the factor 5 to 9 nm/sec.

19981 **(BMFT-FB-T—81-109) Development of a cadmium selenide thin film solar cell. Final report, Mar. 1980.** Rickus, E. (Battelle-Institut e.V., Frankfurt am Main (Germany, F.R.)). Aug 1981. 85p. (In several languages). NTIS, PC A05/MF A01.

Examinations of the physical and chemical structure of thin CdSe films and their surfaces show that not only the electronic structure, but also the orientation and morphology of the semiconductor layer have a strong influence on the photovoltaic properties of the cells. The MIS structures with a chromium back contact, a 2 nm thick undoped CdSe layer, a 4 to 5 nm thick ZnSe layer, and a 20 nm thick gold layer show efficiencies of more than 6% related to a radiation f 100 mW/sq cm reaching the CdSe layer. At the present stage of development, efficiencies of more than 4% can be realized with very simple, not yet optimized ZnS antireflection coatings. As the analysis of current-voltage characteristics shows, the open circuit voltage and the presently relatively low fill factor can be enhanced by improved doping. This gives a realistic goal of about 10% efficiency for further work.

19982 **(BMFT-FB-T—81-159) Development of a process for an inexpensive production of thin film solar cells on an industrial scale. Final report, Jul. 1980.** Ruecker, N. (Heraeus (W.C.) G.m.b.H., Hanau (Germany, F.R.)). Sep 1981. 32p. (In several languages). NTIS, PC A03/MF A01.

A process was developed for an inexpensive production of CdS/Cu(x)S solar cells on an industrial scale. Using a pre-covering evaporated thickness of 3 micron Cd-films exhibit a grain size of more than 3 micron. Cadmium can be converted to alpha-CdS by a thermal treatment in a H_2S-containing atmosphere. It is expected that the time of conversion can be reduced by optimizing the process. The CdS grain size is some tenths of a micron on the surface below the surface it increases. The resistivity of converted CdS-layers can be enhanced in a definite manner by exposure to a glow discharge containing H_2S. Using this technique the connection of the CdS-layer to the substrate by means of Cd-metal is guaranteed. Further investigations should be extended to thicker layers. The Cu(x)S-film should be formed by thermal evaporation.

19983 **(CONF-820217—9) Short-rotation woody crops as a source of energy.** Ranney, J.W.; Cushman, J.H. (Oak Ridge National Lab., TN (USA)). 1982. Contract W-7405-ENG-26. 23p. NTIS, PC A02/MF A01. Order Number DE83007512.

From 9. energy technology conference; Washington, DC, USA (16 Feb 1982).

Progress in the Short-Rotation Woody Crops Program to date is discussed. Results from the 30 research projects currently in the program, as well as from other published short-rotation intensive culture (SRIC) data are drawn on. The possible contribution of eahc major research topic to increased SRIC productivity is assessed. Current and projected SRIC productivity rates across the United States are shown on maps, and the research needed to reach the project levels is explained. (MHR)

19984 **(CONF-821012—5) Economic analysis of short-rotation forestry.** Shen, S.Y.; Jones, P.C.; Vyas, A. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 23p. NTIS, PC A02/MF A01. Order Number DE83007744.

From Institue for Management Sciences/Operations Research Society of America joint meeting; San Diego, CA, USA (25 Oct 1982).

The principles and the technology of short-rotation forestry are described, with some emphasis on the new concept of wood-grass, an annually harvested tree crop, production. The model used for the economic analysis is described and the analysis and findings are presented. Wood-grass technology is identified as having substantial economic as well as technological potential. (MHR)

19985 **(CONF-8208114—1) Economic analysis method for short-rotation forestry.** Vyas, A.D.; Shen, S.Y. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 17p. NTIS, PC A02/MF A01. Order Number DE83007568.

From 2. national conference on renewable energy technologies; San Juan, Puerto Rico (1 Aug 1982).

A method for economic analysis of short-rotation forestry is presented; a model that employs linear complementarity optimization is an important component of this method. Given data on biomass production costs and methods for short-rotation forestry, the model selects the rotation period (i.e., harvesting cycle) that maximizes the net present value of all future profits for a specified rate of return. The ability to select the optimal rotation period is a unique feature of the model. The model's output, combined with independent analysis of the effect of tree spacing on production costs and woody biomass yield, allows specification of least-cost production systems for short-rotation forestry. The results of analyses of three hypothetical forestry plantations in the United States are summarized here. These results, while obtained for specific species and growing conditions, support three general conclusions regarding short-rotation forestry. For conventional straight-row planting of trees at a 4 x 4 ft (1.2 x 1.2 m) spacing, forage harvesting is more economical than whole-tree harvesting. Production costs for this planting strategy can be further reduced through an alternative harvesting technique that uses an innovative circular saw harvester now under development. Short-rotation forestry costs can be minimized, however, by adopting a planting approach in which seedling cuttings are sown as grass seeds are sown - randomly and very densely - and year-old samplings are forage harvested.

19986 **(DDS—108) Ethanol production using microbial cells trapped in polyacrylamidegels.** Villet, R.; Dillon, J. (Solar Energy Research Inst., Golden, CO (USA)). [nd]. 2p. (CONF-790547—). Solar Energy Research Inst., 1617 Cole Boulevard, Golden, CO 80401.

From Electrochemical Society meeting; Boston, MA, USA (7 May 1979).

The biotechnological advantages in using immobilised cells in fermentation systems are discussed and an experiment, using Saccharomyces cerevisiae in batch fermentations is described. The advantages using immobilised cells include the re-use of the micro-organisms, continuous processing mode of the system and enhanced productivities.

19987 **(DOE/ER/60002—1) Energetic and environmental aspects of utilizing crop and forest residues for biomass energy. Final report.** Pimentel, D.; Fast, S.; Gallahan, D.; Moran, M.A. (Cornell Univ., Ithaca, NY (USA)). Feb 1983. Contract AC02-81ER60002. 119p. NTIS, PC A06/MF A01. Order Number DE83008178.

Crop and forest residues are essential to protect the soil from erosion and rapid water runoff and to maintain soil organic matter and nutrients. Only an estimated 20% of the total residues remaining after harvest can be utilized for conversion because of environmental limitations and the impracticality of harvesting residues on some lands. The residues available for biomass energy could produce a maximum amount of gross energy equal to either 232 million barrels of high-grade liquid fuel (about 6% of current US oil consumption), 5% of the electrical energy, or 1.5% of total US energy if residues were used as heat (steam). The net yields of energy from the residues, however, would range from only 10 to 50% of the gross because of the large energy inputs for harvesting, hauling, nutrient replacement, and processing. Although these potential contributions to US energy needs are relatively small, it is renewable energy (assuming no environmental degradation) and therefore has some long-term value to the nation's energy program.

19988 **(DOE/ET/23197—T10) Semicrystalline casting process development and verification. Quarterly progress report number 8, March 19, 1982-June 19, 1982.** (Semix, Inc., Gaithersburg, MD (USA)). 1982. Contract FC01-80ET23197. 42p. NTIS, PC A03/MF A01. Order Number DE83006970.

Work on the first embodiment of the two dimensional thermal model of the Ubiquitous Crystallization Process (UCP) system was started. Boundary conditions consist of experimentally determined temperatures at the edges of the silicon brick. Work continues on the collection of this temperature data and on identifying sources of data for thermal properties of materials used in UCP. Using x-ray and chemical means of analysis, it was observed that neighboring grains can be related by a single or multiple order twinning process. The phenomenon of multiple order twinning allows for the possibility that grain boundaries can be the intersection of specific crystallographic planes such that the dislocation content can be low at the grain boundaries. This increases the effective electrical grain size. Subgrain rotations, on the other hand, are pure dislocation type grain boundaries and are therefore electrically active, as borne out by photoresponse mapping. It is postulated that these subgrain rotations are a mechanism by which a crystal can accommodate a locally high dislocation density. Work has beenperformanced on the fabrication of high efficiency large area solar cells. One hundred 10 cm x 10 cm cells were fabricated with a lot efficiency of 12.4% AMl using a first generation mask patern. It is expected that during the next quarter the resutls will be higher due to improvement of the front contact integrity by use of the second generation mask and an optimization of the BSF.

19989 **(DOE/ID/12328—T1) Alcohol recovery and carbon dioxide purification in alcohol plants using semipermeable membranes. Final technical report, September 1, 1981-August 31, 1982.** Klei, H.E.; Sundstrom, D.W. (Connecticut Univ., Storrs (USA)). Feb 1983. Contract FG07-81ID12328. 27p. NTIS, PC A03/MF A01. Order Number DE83006754.

The fermentation of sugars to ethanol produces carbon dioxide gas, which can carry appreciable quantities of alcohol vapor from the system. This project examined the use of commercially available membranes to separate a gaseous mixture into alcohol rich and carbon dioxide rich streams. The performance of silicone and cellulose acetate membranes in separating alcohol-carbon dioxide mixtures was studied with a single stage test cell. The cellulose acetate membrane passed the alcohol vapor preferentially and gave a better separation than the silicone membranes. The permeabilities of alcohol and carbon dioxide for the cellulose acetate membrane were used to design a continuous membrane column, which makes it possible to achieve a high degree of separation with membranes giving only modest enrichment in a single stage. For a 25 x 10^6 gal/yr alcohol plant, a computer simulation indicated that 200 continuous membrane columns with areas of 93 m^2 each would be needed to recover about 75% of the alcohol and to produce a byproduct stream containing 99.5% carbon dioxide.

19990 **(DOE/ID/12331—T1) Fermentative production of butanol from sorghum molasses as a potential agricultural fuel. Final report, June 26, 1981-September 25, 1982.** Fan, L.T. (Kansas State Univ., Manhattan (USA). Dept. of Chemical Engineering). Dec 1982. Contract FG07-81ID12331. 63p. NTIS, PC A04/MF A01. Order Number DE83008248.

A strain, Clostridium acetobutylicum ATCC 4259, suitable for butanol-acetone fermentation of sorghum molasses was selected from several strains of the American Type Culture Collection (ATCC). It was cultivated in the composition-optimized sorghum molasses medium. The microbial growth and sugar consumption pattern in the sorghum molasses medium exhibited a typical diauxie phenomenon. The results strongly suggest that the difficulty encountered by the Weizmann type of organisms in butanol-acetone fermentation of molasses is due to the diauxie phenomenon causing a significant decrease in the solvent production rate. Acid hydrolysis of sorghum molasses minimizes the occurrence of the phenomenon, thereby remarkably increasing the solvent yield. The final solvent concentrations in the inverted molasses medium were butanol, 1.0% (w/v); acetone, 0.37% (w/v); ethanol, 0.18% (w/v); and total solvent, 1.55% (w/v). The total solvent yield in the inverted sorghum molasses medium was 30.3% based on the weight of sugar consumed. Effects of the temperature, agitation and heat-shocking were also investigated.

19991 **(DOE/ID/12342—T1) New method for simultaneous saccharification and fermentation. Final report.** Charles, M. (Lehigh Univ., Bethlehem, PA (USA). Biotechnology Research Center). 1 Feb 1983. Contract FG07-81ID12342. 88p. NTIS, PC A05/MF A01. Order Number DE83008247.

It was shown that the operating cost of the industrially practiced simultaneous saccharification and fermentation (S/F) of corn starch to ethanol can be decreased significantly. At a scale of 7.8 million gpy anhydrous ethanol it should be possible to decrease the saccharification/fermentation operating costs from about 16 cents per gallon of ethanol produced (anhydrous basis) to about 13 cents per gallon. The improvement is achieved by recirculating unconverted dextrins in the broth through an external immobilized amyloglucosidase (AMG) reactor maintained at 60°C; a microporous hollow fiber filter is used to separate the dextrins from the yeast.

19992 **(DOE/JPL—9950-776) ECUT: energy conversion and utilization technology program. Biocatalysis research activity. Technical and economic assessment of processes for the production of butanol and acetone.** (Chem Systems, Inc., Tarrytown, NY (USA)). Sep 1982. Contract AI01-81CS66001. 76p. NTIS, PC A05/MF A01. Order Number DE83007263.

A preliminary technical and economic evaluation of a process which produces mixed solvents (butanol/acetone/ethanol) via fermentation of sugars derived from renewable biomass resources is presented. The objective is to assess the technology of producing butanol/acetone from biomass, and select a viable process capable of serving as a base case model for technical and economic analysis. The general criteria utilized in determining the design basis for the process are profit potential and non-renewable energy displacement potential. The feedstock chosen, aspen wood, was selected from a number of potential renewable biomass resources as the most readily available in the United States and for its relatively large potential for producing reducing sugars. The butanol/acetone/ethanol (ABE) production facility consists of three major sections: pretreatment and enzyme hydrolysis, fermentation, and purification.

19993 (DOE/JPL/954373—81/19) Silicon-ingot casting: heat-exchanger method (HEM); multi-wire slicing: fixed-abrasive slicing technique (FAST). Phase III and Phase IV. Silicon sheet-growth development for the large-area sheet task of the Low-Cost Solar-Array Project. Final report, December 15, 1978-June 30, 1981. Schmid, F.; Khattak, C.P. (Crystal Systems, Inc., Salem, MA (USA)). Dec 1982. Contract NAS-7-100-954373. 268p. NTIS, PC A12/MF A01. Order Number DE83007035.

It has been demonstrated that directional solidification by the Heat Exchanger method (HEM) is a viable approach for directional solidification of silicon ingots to be used for terrestrial solar cell applications. Some of the significant advances made during this phase of the program are listed. Some of the problems encountered have been growth rate decrease with increased ingot height, silicon carbide precipitates, and high dislocation density in HEM material. The silicon carbide is attributed to backstreaming of oil vapors from the vacuum pump; the high dislocation density is associated with the thermal history of the boule. Using solar metallurgical meltstock nearly single crystal structure has been achieved with one HEM directional solidification. Solar cells fabricated using this meltstock have shown up to 12.33% conversion efficiency. The projected add-on cost of HEM processing using the best simultaneous achievements is \$17.39/m^2 - well within the allocation of \$18.15/m^2 for 1986 goals.

19994 (DOE/JPL/956046—82/5) Structure of (110) tilt boundaries in large-area solar silicon. Annual report, August 31, 1981-September 1982. Ast, D.G. (Cornell Univ., Ithaca, NY (USA). Dept. of Materials Science and Engineering). Dec 1982. Contract NAS-7-100-956046. 25p. NTIS, PC A02/MF A01. Order Number DE83007848.

Symmetric second- and third-order twin boundaries in silicon have been observed using high-resolution TEM. Micrographs of a symmetric (221) $\Sigma = 9$ boundary exhibited contrast features consistent with the zig-zag dislocation structure. A model for a symmetric (552) $\Sigma = 27$ boundary was constructed and found to have the same periodicity and faceted structure as an experimentlaly observed $\Sigma = 27$ boundary. A system for modelling the structure of (110) tilt boundaries in tetrahedrally coordinated materials was developed. Boundaries with (110) median planes and misorientations up to 70.53° were constructed using a repeating series of simple structural units.

19995 (DOE/JPL/956061—6) Investigation of the hydrochlorination of SiCl$_4$. Quarterly report, October 9, 1982-January 8, 1983. Flat-Plate Solar-Array Project, Advanced-Materials Research Task. Mui, J.Y.P. (Solarelectronics, Inc., Bellingham, MA (USA)). 18 Jan 1983. Contract NAS-7-100-956061. 43p. NTIS, PC A03/MF A01. Order Number DE83007036.

A basic, experimental study on the hydrochlorination of silicon tetrachloride and metallurgical-grade silicon with hydrogen gas to form trichlorosilane has been carried out to greatly expand the range of reaction conditions. The equilibrium constant, K/sub p/, for the hydrochlorination reaction was measured as a function of temperature, pressure, and concentration. The variation of the equilibrium constant as a function of temperature provided the measurement on the heat of reaction, ΔH, by the Second Law Method. The value of ΔH was measured to give 10.6 Kcal/mole. The equilibrium constant was also studied as a function of concentration. In agreement with the theory, the equilibrium constant remained constant with respect to the varying $H_2/SiCl_4$ feed ratios. On the other hand, the effect of pressure on the equilibrium constant was found to be more complex. At the lower-pressure range of 25 psig to 100 psig, the equilibrium constant remained constant within experimental error. However, at the higher-pressure range of 150 psig to 500 psig, the equilibrium constant showed a much higher value.

19996 (DOE/JPL/956312—82/01) Stress studies in EFG. First quarterly progress report, July 9, 1982-September 30, 1982. (Mobil Solar Energy Corp., Waltham, MA (USA)). 15 Oct 1982. Contract NAS-7-100-956312. 18p. NTIS, PC A02/MF A01. Order Number DE83007522.

A program to study stress generation mechanisms in silicon sheet growth was started. The purpose of the research is to define post-growth temperature profiles for the sheet that can minimize its stress during growth at high speeds, e.g., greater than 3 cm/min. The initial tasks described concern work in progress toward the development of computing capabilities to (1) model stress-temperature relationships in steady-state ribbon growth, and (2) provide a means to calculate realistic temperature fields in ribbon, given growth system component temperatures as boundary conditions. If it is determined that low stress configurations can be achieved, the modeling is to be tested experimentally by constructing low-stress growth systems for EFG silicon ribbon.

19997 (DOE/JPL/956312—83/02) Stress studies in EFG. Second quarterly progress report, October 1, 1982-December 31, 1982. (Mobil Solar Energy Corp., Waltham, MA (USA)). 15 Feb 1983. Contract NAS-7-100-956312. 22p. NTIS, PC A02/MF A01. Order Number DE83007914.

A computer code which can account for plastic deformation effects on stress generated in silicon sheet grown at high speeds is fully operative. Stress and strain-rate distributions are presented for two different sheet temperature profiles. The calculations show that residual stress levels are very sensitive to details of the cooling profile in a sheet with creep. Experimental work has been started in several areas to improve understanding of ribbon temperature profiles and stress distributions associated with a 10-cm-wide ribbon cartridge system.

19998 (DOE/JPL/956352—1) Hermetic edge sealing of photovoltaic modules. Quarterly technical report. Nowlan, M.J. (Spire Corp., Bedford, MA (USA)). Feb 1983. Contract NAS-7-100-956352. 25p. NTIS, PC A02/MF A01. Order Number DE83007496.

The edge-sealing technique is accomplished by a combination of a chemical bond between glass and aluminum, formed by electrostatic bonding, and a metallurgical bond between aluminum and aluminum, formed by ultrasonic welding. Such a glass-to-metal seal promises to provide a low-cost, long-lifetime, highly effective hermetic seal which can protect module components from severe environments. It is the purpose of this program to develop the above-described sealing techniques and to demonstrate their efectiveness by fabricating a small number of dummy modules, up to eight inches square in size, and testing them for hermeticity using helium-leak-testing methods. Non-destructive test methods will be investigated.

19999 (EUR—7566-EN) Effect of the electrical field in the membrane of photosynthesis. Witt, H.T.; Graeber, P.; Renger, G.; Schlodder, E.; Tiemann, R.; Eckert, H.J.; Sewe, K.U. (Commission of the European Communities, Luxembourg). 1981. 53p. Available from Commission of the European Communities, Luxembourg.

One serious problem for photoelectrochemical solar cells is the tendency of semiconductors to be photodecomposed in contact with an electrolyte. This problem appears as well in cells for water decomposition as in cells for photovoltaic power generation. A great deal of emphasis has therefore internationally been placed on attempts to prevent photodecomposition of the electrodes. Most of the work which is summarized has been devoted to this problem. The aim was to understand the thermodynamics and the kinetic mechanisms of decomposition reactions in order to find either means for the protection of these semiconductors which are known as unstable under normal circumstances.

20000 (EUR—7608-EN) Conversion and chemical storage of solar energy in a photoelectrochemical cell. Lepoutre, G.; Richoux, M.C.; de Backer, M. (Commission of the European Communities, Luxembourg). 1981. 60p. Available from the Commission of the European Communities, Luxembourg.

This work has shown that it was possible to reduce water into hydrogen, by using visible light, Zn, Cr or Mg phthalocyanins as photosensitizers, and, electrochemical recycling of the dyes. The volumes of hydrogen evolved correspond to several uses of the dyes. The amount of dye contained in the cell is of the order of 2 x 10^{-6} Moles. If all the hydrogen evolved came from the destruction of the dye, the maximum volume attainable would be 2.24x10^{-2} ml.

The volumes obtained show that in most cases, the phthalocyanin was used about ten times. Studies of the optical spectra before and after each experiment did not show any appreciable degradation of the dye.

20001 (LBL—15171) Photosensitized electron transport across lipid vesicle walls. Ford, W.E. (Lawrence Berkeley Lab., CA (USA)). Nov 1982. Contract AC03-76SF00098. 400p. NTIS, PC A17/MF A01. Order Number DE83007046.

Thesis.

The prospect of using lipid bilayer vesicles in artificial photosynthetic devices which decompose water photochemically as a means of converting and storing solar energy is addressed. The vesicles serve to mediate charge separation during photosensitized electron transfer reactions. The vesicle systems of particular interest have amphiphilic dyes dissolved in the walls of the vesicles and aqueous solutions of electron-donating and accepting molecules separated by the walls. Photosensitized electron transfer across the bilayer from the donor to the acceptor results in spatially separated redox products, thereby preventing energy-wasting back-reactions between these intermediates in the decomposition of water. The overall strategy and some physicochemical properties of vesicles are outlined. Some electronic spectral and photochemical properties of synthetic amphiphilic dyes are characterized, with emphasis on micellar aqueous media. The evolution of a model system for studying photosensitized electron transport across vesicle walls is described.

20002 (N—82-14228) Tank testing of a 2500-cm2 solar panel. Bever, R.S.; Staskus, J. (National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center). Oct 1981. 17p. NTIS, PC A99/MF A01.

In NASA. Lewis Research Center Spacecraft Charging Technol., 1980 p 211-227 (SEE N82-14213 05-18) REFS.

A 50 cm by 50 cm solar array panel test patch was investigated for spacecraft charging and arcing effects. Bombardment with monochromatic electron was carried out. Some objectives of the test were: (1) to estimate at what voltage of electron bombardment arcing would be probable (2) to find whether the arc's energy would be tolerable or damagingly large (3) to try and separate thermal and photoeffects and, (4) to see whether materials used were such as to minimize arcing. Some conclusions were: In sunlight the tracking data relay satellite's solar panel which has ceria glass on the front and conductive paint on the backside is probably a good design for reducing charge-up. In a geomagnetic substorm simulated in testing there will be arcing at the interconnects during eclipse and transitions into and out of eclipse in testing especially in view of the very cold temperatures that will be reached by this lightweight array. Ceria-doped glass is preferred to fused silica glass for reducing charge build up. The Kapton bare patch should still be conductively painted. The differential voltages on the panel determine when arcing first begins, and the electron beam voltages vary depending upon whether the metallic structure is directly grounded or semifloating.

20003 (N—8228838) Production of liquid fuels out of plant biomass and refuse: Methods, cost, potential. (Stuttgart Univ. (Germany, F.R.)). Sep 1981. 99p. (MIXED). NTIS, PC A05/MF A01.

Different ways of producing biomass and its conversion into high grade fuel for vehicles are reviewed with particular reference to physical and geographical factors, pertaining in the Federal Republic of Germany (FRG). Even with the potentially small amount of biomass in the FRG, the fueling of diesel engines with rape oil or modified ethanol, which can be obtained from any cellulosic feedstock, seems to pose the fewest difficulties and promises greatest efficiency. However, the amount of fuel produced from biomass can probably only meet a very small percentage of the total amount required.

20004 (N—8229354) New strategy for efficient solar energy conversion: Parallel-processing with surface plasmons. Anderson, L.M. (National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center). 1982. 13p. (NASA-TM—82867; E—1236). NTIS, PC A02/MF A01.

An advanced concept for direct conversion of sunlight electricity, which aims at high efficiency by tailoring the conversion process to separate energy bands within the broad solar spectrum is introduced. The objective is to obtain a high level of spectrum-splitting without sequential losses or unique materials for each frequency band. In this concept, sunlight excites a spectrum of surface plasma waves which are processed in parallel on the same metal film. The surface plasmons transport energy to an array of metal-barrier-semiconductor diodes, where energy is extracted by inelastic tunneling. Diodes are tuned to different frequency bands by selecting the operating voltage and geometry, but all diodes share the same materials.

20005 (NASA-CR—161922) Solar cell modules for plasma interaction evaluation. Final report. (Lockheed Missiles and Space Co., Inc., Sunnyvale, CA (USA)). Oct 1981. 47p. NTIS, PC A03/MF A01.

A plasma interaction analysis in support of the solar electric propulsion subsystem examined the effects of a large high voltage solar array interacting with an ion thruster produced plasma. Two solar array test modules consisting of 36 large area wraparound contact solar cells welded to a flexible Kapton integrated circuit substrate were fabricated. The modules contained certain features of the effects of insulation, din-holes, and bonding of the cell to the substrate and a ground plane. The possibility of a significant power loss occurring due to the collection of charged particles on the solar array interconnects was the focus of the research.

20006 (NASA-CR—165040) Modelling of polymer photodegradation for solar cell modules. Somersall, A.C.; Guillet, J.E. (Toronto Univ., Ontario (Canada)). Jul 1981. 16p. NTIS, PC A02/MF A01.

A computer program developed to model and calculate by numerical integration the varying concentrations of chemical species formed during photooxidation of a polymeric material over time, using as input data a choice set of elementary reactions, corresponding rate constants and a convenient set of starting conditions is evaluated. Attempts were made to validate the proposed mechanism by experimentally monitoring the photooxidation products of small liquid alkane which are useful starting models for ethylene segments of polymers like EVA. The model system proved inappropriate for the intended purposes. Another validation model is recommended.

20007 (NASA-CR—165041) Modelling of polymer photodegradation for solar cell modules. Somersall, A.C.; Guillet, J.E. (Toronto Univ., Ontario (Canada)). Apr 1981. 17p. NTIS, PC A02/MF A01.

A computer model including an integration routine was developed and demonstrated to simulate, in principle, the chemical changes which may occur in the photooxidation of hydrocarbons, using as input data a set of elementary reactions, corresponding rate constants and appropriate starting conditions. Application of this model to the photooxidation of pottant and plastic materials used in the LSA module designs provides a reliable predictive capability regarding the useful lifetime of these materials. An earlier mechanism consisting of 46 reactions was simplified considerably by reducing the number of formal termination steps since it became apparent that the major termination process goes via the peroxy radicals. In addition, new reactions of oxygen with acryl radicals (from Norrish type I) to form peracids, which then decompose to form carbon dioxide are included.

20008 (NASA-CR—165042) Flat-plate solar array project. Task 1: silicon material: investigation of the hydrochlorination of $SiCl_4$. Mui, J.Y.P. (Solarelectronics, Inc., Bellingham, MA (USA)). Oct 1981. 17p. NTIS, PC A02/MF A01.

A two inch-diameter stainless steel reactor was designed to operate at pressure up to 500 psig and at temperature up to 600 C in order to study the hydrochlorination of silicon tetrachloride and metallurgical grade (m.g.) silicon metal to trichlorosilane. The hydrochlorination apparatus is described and operation safety and pollution control are discussed.

20009 (NASA-CR—165043) Development of an all-metal thick film cost effective metallization system for solar cells. Ross, B. (Ross (Bernd) Associates, San Diego, CA (USA)). Sep 1981. 40p. NTIS, PC A03/MF A01.

The objectives of the investigation were to provide all-metal screenable pastes using economical base metals, suitable for application to low-to-high conductivity silicon of either conductivity type and possibly to aluminum surfaces. Experiments were conducted with variations in paste parameters, firing conditions, including gas ambients, furnace furniture, silicon surface and others. A liquid medium, intended to provide transport during the carbon fluoride decomposition was incorporated in the paste with promising results.

20010 (NASA-CR—165044) Development of an all-metal thick film cost affective metallization system for solar cells. Ross, B. (Ross (Bernd) Associates, San Diego, CA (USA)). Sep 1981. 32p. NTIS, PC A03/MF A01.

An economical thick film solar cell contact for high volume production of low cost silicon solar array modules was investigated. All metal screenable pastes using base metals were studied. Solar cells with junction depths varying by a factor of 3.3, with and without a deposited oxide coating were used. Cells were screened and fired by a two step firing process. Adhesion and metallurgical results are unsatisfactory. No electrical information is obtained due to inadequate contact adhesion.

20011 (NASA-CR—165060) Advanced solar energy conversion. Lee, J.H. (Vanderbilt Univ., Nashville, TN (USA)). Aug 1981. 22p. NTIS, PC A02/MF A01.

An atomic iodine laser, a candidate for the direct solar pumped lasers, was successfully excited with a 4 kW beam from a xenon arc solar simulator, thus proving the feasibility of the concept. The experimental set up and the laser output as functions of operating conditions are presented. The preliminary results of the iodine laser amplifier pumped with the HCP array to which a Q switch for giant pulse production was coupled are included. Two invention disclosures - a laser driven magnetohydrodynamic generator for conversion of laser energy to electricity and solar pumped gas lasers - are also included.

20012 (NP—3900698) Annual report, July 1981-June 1982. Brown, N.E. (Hawaii Univ., Manoa (USA). Hawaii Natural Energy Inst.). 1982. 95p. University of Hawaii, Hawaii Natural Energy Inst., Manoa, HI.

The report consists of brief progress reports describing thirty-five research projects conducted during FY 1981-1982 in the areas of geothermal energy, ocean thermal energy conversion, biomass, wind energy, solar energy, and hydrogen storage. (ACR)

20013 (NP—3901019) Energy from biomass: Possibilities of a regional development and the substitution of crude oil imports in Brazil. Gaese, H. (Forschungsstelle fuer Internationale Agrarentwicklung e.V., Heidelberg (Germany, F.R.)). 1981. 31p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83901019.

Within the framework of the energy policy of Brazil the production of alcohol - 95% produced from sugar cane - ranks in the first place as the share of fuel consumption in the traffic sector is considerable. In the North-East of the country large bioenergy sources lie fallow near the dry zone. Their utilization would not even require a new plant: these energy sources are the Babacu palm-tree area of the transition zone to the Amazon River. The potential would not only be able to substitute alcohol from sugar cane but it also supplies valuable charcoal (e.g. for steel production).

20014 (NP—3901304) Wood-waste fuels preparation and handling. (Levelton (B.H.) and Associates Ltd., Vancouver, British Columbia (Canada)). Apr 1982. 394p. NTIS (US Sales Only), PC A17/MF A01.

An evaluation of wood waste fuels handling and preparation systems is provided. Major generic components of fuel preparation and handling systems are identified first. The capabilities and limitations of these components are assessed. Size and cost specifications are given for most manufacturers and distributors in Canada. Case studies are given to illustrate successful and unsuccessful wood fuel handling systems. Existing problem areas for wood waste preparation and handling components and systems are identified. Recommendations for the development of improved fuel handling equipment are made.

20015 (NP—3901551) Ohio biomass for energy: annual potential by county. Hitzhusen, F.; Bacon, T.; Cathcart, T.; Gowen, M. (Ohio State Univ., Columbus (USA). Dept. of Agricultural Economics and Rural Sociology; Ohio Agricultural Research and Development Center, Columbus (USA)). Apr 1982. 67p. Ohio State Univ., Agricultural Research and Development Center, Columbus, OH 43210.

The annual sustainable amount of biomass resources in each of Ohio's 88 counties is determined for fuel or energy purposes. The location and magnitude of potential demand for biomass energy resources in the state of Ohio are assessed. Included among the biomass resources are forest biomass, municipal solid waste, three crop residues (corn, wheat, and oats), and animal or livestock manures. The methodology and results of the estimation of usable biomass by resource or feedstock type are presented. Total annual biomass potential in Ohio from the resources inventoried is summarized. (MHR)

20016 (NYSERDA—82-29) Whey protein concentrate market enhancement. Final report. Hudson, L. (Little (Arthur D.), Inc., Cambridge, MA (USA); Cornell Univ., Ithaca, NY (USA). Dept. of Food Science). Sep 1982. 132p. New York State Energy Research and Development Authority, Two Rockerfeller Plaza, Albany, NY 12223.

Whey protein concentrate (WPC) was studied to see whether or not there was sufficient depth in the marketplace to accommodate increased WPC production in the event more whey was converted into alcohol. It was concluded that the current market for WPC is still immature and ample room exists in the marketplace to produce and dispose of WPC. In addition, WPC literature was reviewed so as to evaluate the current state of the art producing WPC. Considerable evidence suggests that more product formulation work is needed to move WPC into the general marketplace. Concurrent to the market and ltierature study WPC was incorporated into select categories of foods where finished goods were enhanced by having WPC incorporated in their formulations. Formulations were produced to demonstrate the fact that products such as ice cream, breedings and batters for fish sticks, and orange juice can be enhanced by using WPC.

20017 (PB—82-213729) Wood and energy in Vermont. Staff report. Bailey, M.R.; Wheeling, P.R. (Economic Research Service, Washington, DC (USA). Natural Resource Economics Div.). Mar 1982. 61p. NTIS, PC A04/MF A01.

This report presents information on residential use of wood energy obtained from two household surveys. The first survey, conducted in 1979, obtained detailed information from more than 550 households. The second or followup survey, conducted a year later, provided estimates of fuelwood use in 1979-80, and more information on likely impacts of the increase in residential demand for wood energy on the State forest resource base.

20018 (PNL—4593) Treatment of biomass gasification wastewater using a combined wet air oxidation/activated sludge process. English, C.J.; Petty, S.E.; Sklarew, D.S. (Pacific Northwest Lab., Richland, WA (USA)). Feb 1983. Contract AC06-76RL01830. 60p. NTIS, PC A04/MF A01. Order Number DE83007801.

A lab-scale treatability study for using thermal and biological oxidation to treat a biomass gasification wastewater (BGW) having a chemical oxygen demand (COD) of 46,000 mg/l is described. Wet air oxidation (WA0) at 300°C and 13.8 MPa (2000 psi) was used to initially treat the BGW and resulted in a COD reduction of 74%. This was followed by conventional activated sludge treatment using operating conditions typical of municipal sewage treatment plants. This resulted in an additional 95% COD removal. Overall COD reduction for the combined process was 99%. A detailed chemical analysis of the raw BGW and thermal and biological effluents was performed using gas chromatography/mass spectrometry (GC/MS). These results showed a 97% decrease in total extractable organics with WA0 and a 99.6% decrease for combined

WAO and activated sludge treatment. Components of the treated waters tended to be fewer in number and more highly oxidized. An experiment was conducted to determine the amount of COD reduction caused by volatilization during biological treatment. Unfortunately, this did not yield conclusive results. Treatment of BGW using WAO followed by activated sludge appears to be very effective and investigations at a larger scale are recommended.

20019 (PNL-SA—11039) **Catalytic steam gasification of biomass for methanol and methane production.** Mudge, L.K.; Mitchell, D.H.; Baker, E.G.; Brown, M.D.; Robertus, R.J. (Pacific Northwest Lab., Richland, WA (USA)). 1983. Contract AC06-76RL01830. 48p. (CONF-830114—5). NTIS, PC A03/MF A01. Order Number DE83008024.

From Energy from biomass and wastes symposium; Lake Buena Vista, FL, USA (24 Jan 1983).

The purpose of the project is to evaluate the technical and economic feasibility of producing specific gas products via the catalytic gasification of biomass. The results of research conducted from October 1980 to November 1982 are presented. The project was comprised of laboratory studies, process development, and economic analyses. The laboratory studies were conducted to develop operating conditions and catalyst systems for generating methane-rich gas, synthesis gases, hydrogen, and carbon monoxide. The process development unit (PDU), previously used for tests at atmospheric pressure, was modified for operation at absolute pressures of up to 10 atm (1000 kPa). A program for use on a microcomputer was written to determine the effect of yield changes at elevated pressures on process economics.

20020 (SAND—82-7133) **Second-generation photovoltaic-concentrator-array design.** Broadbent, S.; Baumann, J.E.; Heller, B.W.; Hughes, D.J.; Marshall, L.S.; Semma, R.P.; Stegeman, R.E. (Sandia National Labs., Albuquerque, NM (USA); Martin Marietta Corp., Denver, CO (USA)). Dec 1982. Contract AC04-76DP00789. 389p. NTIS (US Sales Only). Order Number DE83007578.

Martin Marietta Corporation's design of a second generation concentrating photovoltaic module is described. The passively cooled 13-kg module uses 2 columns of 7 point focus Fresnel lenses that are each 20.7 cm by 20.7 cm, and 14 planar junction silicon cells. The geometric concentration is 84X. Martin Marietta fabricated five prototype modules and shipped three to Sandia for testing. The modules' peak efficiency was 14.1% which is the highest to date for a module using silicon cells.

20021 (SERI/PR—9038-1-T1) **Feasibility of biogas production on farms.** Jewell, W.J.; Adams, B.A.; Eckstrom, B.P.; Fanfoni, K.J.; Kabrick, R.M.; Sherman, D.F. (Cornell Univ., Ithaca, NY (USA). Dept. of Agricultural Engineering). Jan 1982. Contract AC02-77CH00178;AC02-76ET20051. 178p. NTIS, PC A09/MF A01. Order Number DE83007385.

An overview of biogas technology is presented. The following topics are discussed: the potentials and limitations of anaerobic digestion; on-site energy generation: relationship of demand to supply; economics of farm-scale biogas production; design considerations of the biogas production system; gas utilization; safety guidelines and regulations; and operation, maintenance, and diagnostics of small methane generation systems. (MHR)

20022 (SERI/STR—231-1744) **Parametric analysis support for alcohol-fuels process development. Final report, 1 January-30 June 1981.** (Chem Systems, Inc., New York (USA)). Feb 1983. Contract AC02-77CH00178. 169p. NTIS (US Sales Only). Order Number DE83008130.

Parametric analyses are described of an alcohol fuels plant producing 50 million gal/y of ethanol by the high temperature dilute acid hydrolysis of aspen wood or corn stover. Analyses were carried out using a computer simulation. The simulation performs material and energy balances, estimates capital and operating costs, and calculates the selling price of ethanol. Pretretments and delignification are shown to be justified only if the value of lignin is greater than $0.40/lb. Sensitivity analyses determine the effect of hydrolysis conditions on yield and selling price. Sugar concentration prior to fermentation is shown not to be justified.

20023 (SERI/TP—232-1733) **Fermentation of soluble cello-oligosaccharides by yeasts.** Lastick, S.M.; Spindler, D.D.; Grohmann, K. (Solar Energy Research Inst., Golden, CO (USA)). Feb 1983. Contract AC02-77CH00178. 14p. (CONF-820909—18). NTIS, PC A02/MF A01. Order Number DE83007317.

From National meeting of the American Chemical Society; Kansas City, MO, USA (1 Sep 1982).

Yeast strains that ferment cellobiose were examined with respect to fermentation on soluble cellodextrin preparations. Hydrolysis of the fermentation products was followed using thin layer chromatography. Candida and Brettanomyces sp. hydrolyze cellobiose and, at a much lower rate, cellotriose, indicating the presence of β-glucosidase (EC 3.2.1.21) activity. Enzyme assays conducted on B. clausenii fermentations indicated that the β-glucosidase remained cell-associated during fermentation. Torulopsis sp. hydrolyzed all of the cello-oligo-saccharides, indicating exoglucanase (EC 3.2.1.91) activity. The exogluconanase, a glycoprotein with an apparent molecular weight of 8.4 x 10^4 daltons, is exported into the culture medium.

20024 (SERI/TR—8104-3-T4) **Low-cost, sprayed CdTe solar-cell research. Final report.** Squillante, M.R.; Turcotte, R.; Entine, G.; Goldner, R.B. (Tufts Univ., Medford, MA (USA)). Dec 1982. Contract AC02-77CH00178. 66p. NTIS, PC A04/MF A01. Order Number DE83007275.

The program reported has examined techniques to deposit CdTe based solar cells by a spray pyrolysis process called Reductive Multichemical Deposition (RMD). The principles of the process and the major results obtained during the program are appended. Results of electrical testing performed on films and devices are presented, and the experiments performed on the CdS layer are discussed. Improving the quality of the CdS layer, the CdS surface CdS/CdTe interface was deemed to be crucial in increasing device performance. In addition, films of CuIn Se_2 were spray deposited in order to investigate further the potential power of the RMD process. (LEW)

20025 **Photocapacitance of mobile carriers in hydrogenated amorphous silicon solar cells.** Crandall, R.S. (RCA Laboratories, Princeton, New Jersey 08540). *Applied Physics Letters;* **42**: No. 5, 451-453(1 Mar 1983). Contract AC02-77CH00178.

Measurements of the capacitance due to photogenerated electrons and holes that are displaced by the electric field are described. A model calculation shows that the photocapacitance is a measure of the drift mobility of the carriers.

20026 **Method of fabricating a solar cell array.** Coyle, P.J.; Crouthamel, M.S.; Lazzery, A.G. (to Dept. of Energy). US Patent 4,364,508. 21 Dec 1982. Filed date 14 Oct 1980. vp.

PAT-APPL-196205.

A first set of pre-tabbed solar cells are assembled in a predetermined array with at least part of each tab facing upward, each tab being fixed to a bonding pad on one cell and abutting a bonding pad on an adjacent cell. The cells are held in place with a first vacuum support. The array is then inverted onto a second vacuum support which holds the tabs firmly against the cell pads they abut. The cells are exposed to radiation to melt and reflow the solder pads for bonding the tab portions not already fixed to bonding pads to these pads.

20027 **Environmental testing of single-crystal silicon solar cells with screen-printed silver contacts.** Firor, K.; Hogan, S. (Solar Energy Research Institute, Golden, CO). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Reliability;* **R-31**: 271-275(Aug 1982).

20028 **Net energy analysis of methanol and ethanol production.** Perez-Blanco, H.; Hannon, B. (Oak Ridge National Lab, Oak Ridge, TN 37830 USA). *Energy (Oxford);* 7: No. 3, 267-280(1982).

The production processes and end uses are analyzed for fuel-grade EtOH and MeOH to assess the potential energy savings introduced by alcohol production from renewable feedstock. Whereas MeOH production from wood brings about energy savings, EtOH production from corn may or may not save energy depending on the end use of the alcohol. If the alcohol is used as a motor fuel, no overall energy savings are found.

20029 **(CNES—81/CT/PRT/SST/SM/178) Modal analysis of structures with prestress effects: application to flexible solar generators.** Boissin, B. (Centre National d'Etudes Spatiales, 31 - Toulouse (France)). May 1981. 76p. (In French). NTIS, PC A05/MF A01.

A model of the dynamic behavior of a flexible solar array which is part of a satellite-borne solar generator for spacecraft power supply (4 to 10kW) is presented. Results are appropriate for solving problems of spacecraft attitude control. The array is depicted as a skin covered by solar cells. Modal characterization of prestressed structures is explained for the calculation of differential rigidity. The method is demonstrated for a beam loaded at each end and for a square plate loaded along two opposite sides. Results for an array which is deployed along a telescoping mast are shown. (ESA)

20030 **Biomass: source of tomorrow's chemicals.** Lipinsky, E.S. (Battelle, Columbus Lab, Columbus, OH 43201, USA). pp 69-82 of Cereals; Renewable Resource, Theory and Practice. Pomeranz, Y.; Munck, L. St. Paul, MN; American Association of Cereal Chemists (1981).

A review is presented of chemicals and fuels manufactured from biomass. (Refs. 17).

1406 Photovoltaic Power Systems

REFER ALSO TO CITATION(S) 20020

20031 **(ANL/NESC—937) SOLCEL2; simulation of photovoltaic systems.** Hoover, E.R.; Linn, J.K. (Sandia National Labs., Albuquerque, NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048937.

The logic for energy flow is fixed. The system's annual performance is assumed to be constant over its economic lifetime.

SOLCEL2 was developed as a system analysis tool for performing studies to identify and evaluate by hour-by-hour simulation promising photovoltaic (PV) applications. Made up of a collection of component model subroutines linked by an executive routine, SOLCEL2 allows the user to model a variety of system configurations with a minimum number of input variables. Hourly weather data and an hourly electrical load profile (unless the utility mode of operation is specified) for an entire year are required as input. Twelve different array orientation schemes are provided. The three basic types of collectors modeled are flat-plate, linear-focus concentrator, and point-focus concentrator. Each of the three types has three options for cell cooling. Four different methods of modeling the photovoltaic conversion process are available including maximum power tracking, floating battery, voltage regulator, and temperature-degraded efficiency. The first three methods use a detailed solar cell model while the fourth uses a very simple temperature-corrected efficiency model.CDC6600,7600,CYBER175; SOLCEL2 is written primarily in ANSI FORTRAN.; NOS (CDC6600,CYBER175) and SCOPE 2.1 (CDC7600); 70,000 (octal) words of central memory are required to execute the program.

20032 **(BMFT-FB-T—81-082) Energy storage systems for terrestrial solar generators. Final report, Dec. 1980.** Jung, M. (Varta Batterie A.G., Kelkheim (Germany, F.R.). Forschungs- und Entwicklungszentrum). May 1981. 76p. (In several languages). NTIS, PC A05/MF A01.

Mercury can react with Raney nickel to form the alloy $NiHg_4$. This intermetallic compound is the basis of an excellently rechargeable positive electrode material. In combination with cadmium it forms a rechargeable cadmium/mercury oxide cell which can be operated under hermetically sealed conditions. Since both electrodes are thermodynamically stable in aqueous alkaline electrolytes, the self discharge rate of the cell is very low and hence the Coulomb efficiency even at very low charge rates in the order of 1000 - 2000 hrs. is higher than 95%. The cadmium/mercury oxide cells can be cycled more than a hundred times. These cells are particularly qualified to serve as an energy storage in combination with photovoltaic cells.

20033 **(DOE/CS/24280—2) Photovoltaic concentrator application experiment. Final report.** Brink, D.; Lowe, W.; Maraschin, R.; Masters, W.; Van Ekelenburg, A.; Wong, V. (Acurex Corp., Mountain View, CA (USA). Alternate Energy Div.). May 1980. Contract AC04-78CS24280. 215p. NTIS, PC A10/MF A01. Order Number DE83008109.

The detailed design has been completed of a 75 kWe photovoltaic energy system to supply both electricity and hot water for a hospital in the Hawaiian Islands. The application selected for this experiment, the system design, two actively cooled concentrating array designs, and projected system performance are described.

20034 **(DOE/ET/20279—177) Natural Bridges National Monument photovoltaic power plant: maintenance manual.** Solman, F.J.; Baird, R.H. (eds.). (Massachusetts Inst. of Tech., Lexington (USA). Lincoln Lab.). Feb 1982. Contract AC02-76ET20279. 428p. NTIS, PC A19/MF A01. Order Number DE83008294.

An overview is provided of the operation of the system as well as detailed discussions of the various subsystems. These include the automatic control system hardware and software as well as signal conditioning instrumentation and array control equipment.

20035 **(DOE/ET/20279—219) Photovoltaic-system evaluation at the Northeast Residential Experiment Station. Final report, November 1980-May 1982.** Russell, M.C. (Massachusetts Inst. of Tech., Lexington (USA). Lincoln Lab.). Jan 1983. Contract AC02-76ET20279. 163p. NTIS, PC A08/MF A01. Order Number DE83008259.

Residential photovoltaic systems have been under evaluation by Massachusetts Institute of Technology Lincoln Laboratory since late 1980. At the Northeast Residential Experiment Station in Concord, Massachusetts, five residential photovoltaic systems have undergone a comprehensive testing program designed to evaluate the systems' performance and cost. Results of this activity are presented. The five systems each consist of an unoccupied structure employing a roof-mounted photovoltaic array and a utility-connected power inverter capable of sending excess PV generated energy to the local utility system. The photovoltaic systems are designed to meet at least 50% of the total annual electrical demand of residences in the cold-climate regions of the country. Investigation included these specific issues: photovoltaic array and inverter system power rating and performance characterization, system energy production, reliability and system cost/worth. In addition, summary load data from five houses in the vicinity of the Northeast Residential Experiment Station, and meteorological data from the station's weather station are also presented.

20036 **(DOE/ET/20279—221) Effects on the utility feeder of utility-interactive inverters at the Northeast Residential Experiment Station.** Shelton, P.S.; Solman, F.J.; Nichols, B.E. (Massachusetts Inst. of Tech., Lexington (USA). Lincoln Lab.). Jan 1983. Contract AC02-76ET20279. 41p. NTIS, PC A03/MF A01. Order Number DE83007476.

The utility feeder for the Northeast Residential Experiment Station (NE RES) in Concord, MA, is a 2.4/4.16-kV circuit from the Concord Municipal Light Plant. The line was modeled analytically to predict the effects of loads and injected photovoltaic (PV) power applied at the NE RES. Measurements were made with instrumentation installed on the feeder near the substation and at the NE RES. The effects were compared with predictions. Measurements of ambient harmonic voltage and currents were made near the substation.

20037 (DOE/ET/20279—235) **Solarex final report: design and fabrication of a prototype system for a photovoltaic residence in the Southwest.** Gibson, R. (Solarex Corp., Rockville, MD (USA)). Nov 1982. Contract AC02-76ET20279. 95p. NTIS, PC A05/MF A01. Order Number DE83008128.

This project consisted of the design of an energy-efficient, photovoltaic, single-family residence suitable for construction in the Southwest and the fabrication and testing of a Prototype System based on that residence design. The Prototype, constructed at the Southwest Residential Experiment Station in Las Cruces, New Mexico, contains the power conditioning unit, test equipment, and load simulation equipment. The standoff photovoltaic array, consisting of 78 Solarex Powerline series modules, produces 5-kilowatts peak. The photovoltaic system is connected to the utility.

20038 (DOE/ET/20279—238) **ARCO Solar final report: fabrication of a prototype system for residences in the Southwest.** Yenamandra, R.; Schuetz, P. (ARCO Solar, Inc., Chatsworth, CA (USA)). Dec 1982. Contract AC02-76ET20279. 88p. NTIS, PC A05/MF A01. Order Number DE83008260.

A 7.4-kWp photovoltaic system was designed for an energy-conservative structure. The design of this house and construction of the photovoltaic portions, referred to as the Prototype System, is described. The problems and solutions addressed during the design and construction of the Prototype System are discussed.

20039 (N—82-25966) **Differential charging model of solar panels.** Maassberg, H.; Isensee, U. (Technische Hochschule Darmstadt (Germany, F.R.)). Feb 1982. 9p. NTIS, PC A04/MF A01.

In ESA GIOTTO Spacecraft Gas and Plasma Environ. p 25-33 (SEE N82-25962 16-75) REFS.

Two-dimensional (cylindrically symmetric thick sheath approximation) and three dimensional (spherically symmetric) models of Giotto solar panel charging are presented. An element of the quartz layer on the panels is regarded as a capacitor with a fixed potential at one plate, representing the floating potential of the inner structure of the spacecraft. This capacitor is charged by the current density of photoelectrons and by plasma electrons leaving or striking the surface. The charging equation can be integrated numerically, using the current densities of the photoelectrons and ambient plasma electrons. An iterative procedure is employed in order to satisfy the boundary value of the surface potential on solar panels. Results are similar for both models, with differences occuring only on the sunlit side of the panels. Near the comet nucleus, differential charging of 10V is predicted. Plasma analyzer functioning will not be affected by this charging.

20040 (N—8228349) **Analytical modeling of spacecraft power systems. Final Report, July 1981-April 1982.** Cassinelli, J. (TRW, Inc., Redondo Beach, CA (USA)). Apr 1982. 170p. (NASA-CR—166820). NTIS, PC A08/MF A01.

Power system components are reviewed. Battery and solar array models are discussed. Shunt regulators, dc-dc converters, and cabling are also discussed.

20041 (NASA-CR—165323-VOL-1) **Study of multimegawatt technology needs for photovoltaic space power systems. Volume 1: executive summary.** Peterson, D.M.; Pleasant, R.L. (General Dynamics/Convair, San Diego, CA (USA)). Aug 1981. 28p. NTIS, PC A03/MF A01.

Possible missions requiring multimegawatt photovoltaic space power systems in the 1990's time frame and associated power system technology needs are examined. The following concepts for photovoltaic power approaches are considered: planar arrays, concentrating arrays, hybrid systems using Rankine engines, thermophotovoltaic and AC/DC power management approaches, battery, fuel cell, flywheel energy storage, and interactions with the electrical ion engine injection and stationkeeping system. The levels of modularity for efficient, safe, constructable, serviceable, and cost effective system design are analyzed, and the benefits of alternate approaches developed. Both manned low Earth orbit and unmanned geosynchronous Earth orbit applications were examined for technological development. Technology developments applicable to power systems which appear to have benefits independent of the absolute power level are suggested.

20042 (NASA-CR—165323-VOL-2) **Study of multimegawatt technology needs for photovoltaic space power systems, volume 2. Final report.** Peterson, D.M.; Pleasant, R.L. (General Dynamics/Convair, San Diego, CA (USA)). Mar 1981. 285p. NTIS, PC A13/MF A01.

Possible missions requiring multimegawatt photovoltaic space power systems in the 1990's time frame and power system technology needs associated with these missions are examined. Four specific task areas were considered: (1) missions requiring power in the 1-10 megawatt average power region (2) alternative power systems and component technologies (3) technology goals and sensitivity trades and analyses and (4) technology recommendations. Specific concepts for photovoltaic power approaches considered were: planar arrays, concentrating arrays, hybrid systems using Rankine engines, thermophotovoltaic approaches all with various photovoltaic cell component technologies. Various AC/DC power management approaches, and battery, fuel cell, and flywheel energy storage concepts are evaluated. Interactions with the electrical ion engine injection and stationkeeping system are also considered.

20043 (NASA-TM—58237-VOL-4) **Satellite power system: concept development and evaluation program. Volume 4: energy conversion and power management.** (National Aeronautics and Space Administration, Huntsville, AL (USA). George C. Marshall Space Flight Center). Nov 1981. 369p. NTIS, PC A16/MF A01.

Additional analyses that were performed to supplement the NASA/Department of Energy (DOE) Satellite Power System (SPS) reference system concept are presented in this volume. A brief review of the reference concept is provided together with detailed descriptions of energy conversion, power distribution, and power management for solar photovoltaics (silicon and gallium arsenide), solar thermal (Brayton and Rankine cycles), and concept comparisons (solar thermal and energy conversion). Results of other studies concerning energy conversion and power management (environmental impacts, annealing, nuclear SPS concept, and thermionic) are included.

20044 (NASA-TM—58238-VOL-7) **Satellite power system: concept development and evaluation program. Volume 7: space transportation.** (National Aeronautics and Space Administration, Huntsville, AL (USA). George C. Marshall Space Flight Center). Nov 1981. 258p. NTIS, PC A12/MF A01.

During the several phases of the Satellite Power System (SPS) Concept Definition Study, various transportation system elements were synthesized and evaluated on the basis of their potential to satisfy overall SPS transportation requirements and their sensitivities, interfaces, and impact on the SPS. Additional analyses and investigations were conducted to further define transportation system concepts that will be needed for the developmental and operational phases of an SPS program. To accomplish these objectives, transportation systems such as the Shuttle and its derivatives have been identified new heavy-lift launch vehicle (HLLV) concepts, cargo and personnel orbital transfer vehicles (COTV and POTV), and intra-orbit transfer vehicle (IOTV) concepts have been evaluated, and, to a limited degree, the program implications of their operations and costs were assessed. The results of these analyses have been integrated into other elements of the overall SPS concept definition studies.

20045 (PML—1980-06) **Solar power systems smaller than 500 W for military use.** Wittgen, P.P.M.M. (Prins Maurits Lab. TNO, Rijswijk (Netherlands)). Nov 1979. 27p. (In several languages). NTIS, PC A03/MF A01.

A literature search of the feasibility of using photovoltaic cells for the energy supply of low power-consuming military equipment is presented. Progress in the technology of solar cells in the coming years offers good prospects for the use of photovoltaic systems. A hybrid system consisting of an array of solar cells combined with secondary batteries in a sunny climate is capable of supplying equipment with energy. Climatic conditions in the Netherlands and the northern part of Germany are too bad for a fully self-supporting year round system. Especially in winter the intensity and quantity of the radiation is too low. In these northern regions the hybrid solar system can only be used when additional primary or secondary batteries are accepted in the winter period.

20046 **(SAND—82-1790C) PV concentrator array power costs.** Maish, A.B. (Sandia National Labs., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 7p. (CONF-830405—2). NTIS, PC A02/MF A01. Order Number DE83002518.

From 6. annual ASME technical conference on commercial building heating and cooling applications; Orlando, FL, USA (19 Apr 1983).

Photovoltaic concentrator array installed costs per adjusted peak watt (W/sub ap/) have been developed for three leading tracking structure designs using current and expected concentrator module performance. Total installed costs are presented for the arrays for $10^5 m^2$/y production and 500 kW/sub p/ field sizes. Array field annual performance and power costs are developed as a function of array spacing using the results of a detailed computer performance code which includes the effects of array shading, series/parallel wiring, bypass diode, maximum power tracking, and PCU voltage limitations. Results indicate installed costs of the three arrays are within 10% of each other. Installed power costs are relatively insensitive to array spacing and are approximately $4/W/sub ap/ with current technology and can be expected to drop to $3 to $3.50/W/sub ap/ with array cost reductions and cell efficiency improvements.

20047 **(SAND—82-7152) User's guide to SOLREL: a simulation of reliability and availability of photovoltaic systems.** Stember, L.H.; Huss, W.R. (Battelle Columbus Labs., OH (USA)). Jan 1983. Contract AC04-76DP00789. 105p. NTIS, PC A06/MF A01. Order Number DE83007581.

SOLREL is a computer-based simulation for analyzing the reliability and availability of PV systems. It provides a tool to model their functional behavior and the effects of component and system reliability. It will also predict annual maintenance costs and the annual production of power for photovoltaic power systems, allowing for failures and degradation. These effects are measured by the resulting change in life cycle costs or life-cycle energy costs. The Guide's contents are as follows: Chapter I summarizes problems SOLREL can address and provides a description of the potential impact and use of the model; Chapter II gives an overview of the modeling approach, including how it incorporates degradation, failures and repairs; Sample outputs from SOLREL are also included in this chapter. Chapters III and IV present results of the application of SOLREL to a commercial concentrator and a residential flat panel PV system; Chapter V discusses the use of SOLREL in sensitivity analysesl; Several approaches to testing various design alternatives are given. Appendix A provides format information to guide the preparation of input data. Appendix B is a comprehensive, annotated listing of the SOLREL software for a flat panel system. This permits the analyst to follow through the computer program step-by-step, if desired.

20048 **(SAND—83-0155C) New designs and installations of photovoltaic-array fields with low balance-of-system costs.** Post, H.N.; Burgess, E.L. (Sandia National Labs., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 9p. (CONF-830213—2). NTIS, PC A02/MF A01. Order Number DE83006292.

From 10. energy technology conference; Washington, DC, USA (28 Feb 1983).

The design, development, and prototype installation of low-cost, modular array fields for flat-plate photovoltaic (PV) systems are described. Key features of the array field balance-of-system (BOS) components including structures, foundations, intermodule connection, field wiring, and system grounding are identified. Cost projections for the two alternative building-block array-field designs which have been developed show a significant reduction in the BOS costs compared to that experienced in previous PV installations. Prototype array fields of each design have been installed in the Sandia Test Facility.

20049 **The U.S. National Photovoltaic Program.** Magid, L.M.; Maycock, P.D. (U.S. Dept. of Energy, Div. of Distributed Solar Tech., Washington, DC). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 887-892(1980). (CONF-800106—).

The Photovoltaic Energy System Program proposed by the United States Department of Energy is discussed with reference to the program strategy and goals, major elements, and management. A key element in this program is the expectation that photovoltaic residences will begin to be cost effective within the Southwestern United States when modules are priced at 70 cents/peak watt and the total installed system costs from $1.6 to $2.20 per peak watt (in 1980 dollars). The program anticipates this occurring in 1986.

1407 Solar Thermal Power Systems

REFER ALSO TO CITATION(S) 19971, 19972, 20090, 20090, 20119, 20136, 20138

20050 **(BMFT-FB-T—81-097) Gas cooled solar power plant for generating electrical enetgy in the 20MWe operating range (GAST): preliminary design phase. final report, nov. 1980.** Kostrzewa, S.; Wehowsky, P. (Internationale Atomreaktorbau G.m.b.H. (INTERATOM), Bergisch Gladbach (Germany, F.R.)). Jul 1981. 33p. (In several languages). NTIS, PC A03/MF A01.

R D work required for the erection of a pilot plant was defined. Since the location of the site is not yet determined, the project work was based on preliminary basic data. Significant results of the preliminary design phase include both the choice of a combined gas/steam thermal energy conversion process for the reference concept and basic concepts for heliostat, heliostat field arrangement, receiver, tower and master control/process computer system.

20051 **(BMFT-FB-T—81-101) Development of a prototype of a 10 kw small solar power plant. Final report, Sep. 1979.** Maier, F.; Haenfling, J. (Dornier-System G.m.b.H., Friedrichshafen (Germany, F.R.)). Jun 1981. 170p. (In several languages). NTIS, PC A08/MF A01.

Activities performed in the design and construction of a solar driven 10 kW turbogenerator for local TV-educational systems, irrigation pumps and other applications in developing countries include: (1) System design and thermodynamic calculation (2) Design of the collector array and construction (3) Fixing of components and auxiliary units (4) Turbine design, construction, manufacture and test run (5) Generator design, construction, manufacture and test run (6) Turbogenerator integration and test (7) Electrical supply, plant control and regulation and (8) Test assembly, performance and analysis. Component tests are being run and are being evaluated by a data acquisition unit installed on site.

20052 **(BMFT-FB-T—81-154) Organic fluids for the practical use in energy conversion systems of solar power plants. Final report, Jun. 1980.** Schmidt, G.; Wolf, D.; Raasch, E. (Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (Germany, F.R.)). Sep 1981. 76p. (In several languages). NTIS, PC A05/MF A01.

With respect to their specific performance, the most promising organic fluids were determined for their practical use in Rankine cycles operating in the temperature range between 150 and 400 C. For these fluids, the process cycle efficiencies were compared for different temperature levels. Laboratory experiments with a great number of fluids and lubricants results in the estimation of the operation limit in Rankine Cycles. A test facility consisting of a heating system, an organic Rankine cycle and a control and measurement system was designed, built, and put into operation for testing various working fluids.

20053 (BMFT-FBT—81-119) **Development of a simple water pump driven with solar energy. Final report.** Schneller, D.; Speidel, K. (Dornier-System G.m.b.H., Friedrichshafen (Germany, F.R.)). Aug 1981. 48p. (In several languages). NTIS, PC A03/MF A01.

A piston engine, a solar collector with direct evaporation, and a processing plant were developed and constructed. The water pump worked satisfactorily under three months of European weather conditions. A total efficiency of 2.5% was reached (efficiency being defined as hydraulic output/solar energy input on installed collector field). The pump is intended to meet the water requirements of small village communities.

20054 (CEA-CONF—6248) **Construction of a 100 kW solar thermal-electric experimental plant.** Boy-Marcotte, J.L.; Dancette, M.; Bliaux, J.; Bacconnet, E.; Malherbe, J. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Apr 1982. 7p. (CONF-820410—10). Dep. NTIS (US Sales Only), MF A01. Order Number DE83901343.

From ASME solar energy conference; Albuquerque, NM, USA (26 Apr 1982).

A focussing collector thermal-electric power plant has just been erected in Corsica (France). This plant consists of a field of 1176 m fixed mirror concentrators, producing heat at 250C, a stratification thermal energy storage of about 1250 kWh, two power conversion units of 45 kWe each, with a supersonic turbine expanding a heavy organic working fluid, and two cooling towers of 200 kW each. This full-scale prototype has been built mainly in order to demonstrate the interest of the distributed collector solar plant concept, in the power range from 50 kWe to 1000 kWe, and the temperature range from 150 to 300C. This paper describes the conceptual design and the performances of the plant, and discusses problems which were met during construction

20055 (DOE/AL/19929—T7) **Section 210 of PURPA and solar-thermal-energy development: the current regulatory environment and suggestions for future action. Task III report.** (Nossaman-Krueger and Knox, Washington, DC (USA)). Jan 1983. Contract AC04-82AL19929. 103p. NTIS MF A01. Order Number DE83006992.

Section 210 of the Public Utility Regulatory Policies Act of 1978 (PURPA) (16 U.S.C. Section 824a-3) (Attachment 1) was enacted to overcome certain institutional barriers and to provide a favorable, non-discriminatory regulatory environment for the integration of electricity-producing solar thermal and other qualifying technologies into the electric utility network. PURPA Section 210 is designed to reduce these institutional barriers for qualifying cogeneration and small power production facilities (QF's) - terminology which includes solar thermal facilities producing electricity for sale, if other prerequisites are met - by exempting certain QF's from economically burdensome legal requirements applicable to electric utilities, and by requiring utilities to offer to purchase electricity from, and sell electricity to, QF's at reasonable and non-discriminatory rates. The present and future PURPA Section 210 regulatory implications for solar thermal QF's are explored. The current PURPA Section 210 regulatory environment and its consequences for solar thermal energy development are outlined. Legislation pending before Congress to amend PURPA Section 210 is described. Possible amendments to PURPA Section 210 that might further stimulate construction and operation of economically sound solar thermal facilities are explored.

20056 (DOE/JPL—1060-52) **Parabolic-dish solar-thermal power annual program review.** (Jet Propulsion Lab., Pasadena, CA (USA)). 15 Jul 1982. Contract AT04-81AL16228. 350p. (JPL-PUBL—82-66; CONF-811261—). NTIS, PC A15/MF A01. Order Number DE83000474.

From Parabolic dish solar thermal power annual program review; Atlanta, GA, USA (8 Dec 1981).

Separate abstracts were prepared for 24 papers in this conference proceedings. (LEW)

20057 (DOE/JPL—1060-52, pp 49-52) **Small community solar thermal power experiment.** Kiceniuk, T. (Jet Propulsion Lab., Pasadena, CA). 15 Jul 1982. NTIS, PC A15/MF A01.

From Parabolic dish solar thermal power annual program review; Atlanta, GA, USA (8 Dec 1981).

The status of the small Community Solar Thermal Power Experiment is reviewed. The plant size has been reduced to 25 kW from an original capacity of 5 MW. Because of the modular nature of the parabolic dish, distributed-generation, Rankine system, changes in plant size have only a secondary effect on plant design. Another advantage to the modular scheme is that fully automated operation is virtually intrinsic to its conception, with each module capable of performing several tasks independently. The status of hardware and performance testing is described, as well as site-related activities. (LEW)

20058 (DOE/JPL—1060-52, pp 53-99) **Development status of the small community solar power system.** Pons, R.L. (Ford Aerospace & Communications Corp., Newport Beach, CA). 15 Jul 1982. NTIS, PC A15/MF A01.

From Parabolic dish solar thermal power annual program review; Atlanta, GA, USA (8 Dec 1981).

The development status and test results for the Small Community Solar Thermal Power Experiment (SCSE Program) are presented. Current activities on the Phase II power module development effort are presented with emphasis on the receiver, the plant control subsystem and the energy transport subsystem.

20059 (DOE/JPL—1060-52, pp 101-113) **Organic Rankine power conversion subsystem development for the small community solar thermal power system.** Barber, R.E. (Barber-Nichols Engineering Co., Arvada, CA); Boda, F.P. 15 Jul 1982. NTIS, PC A15/MF A01.

From Parabolic dish solar thermal power annual program review; Atlanta, GA, USA (8 Dec 1981).

The development and preliminary test results are described for an air-cooled, hermetically-sealed 20 kW/sub e/ organic Rankine (ORC) cycle engine/alternator unit for use with Point Focussing Distributed Receiver (PFDR) solar thermal power systems. 750°F toluene is the working fluid and the system features a high speed, single-stage axial flow turbine direct-coupled to a Permanent Magnet Alternator (PMA). Good performance has been achieved with the unit in preliminary tests and testing is continuing.

20060 (DOE/JPL—1060-52, pp 123-145) **Recent tests on the Carter small reciprocating steam engines.** Kiceniuk, T.; Wingenbach, W. (Jet Propulsion Lab., Pasadena, CA). 15 Jul 1982. NTIS, PC A15/MF A01.

From Parabolic dish solar thermal power annual program review; Atlanta, GA, USA (8 Dec 1981).

A steam engine was tested with a fuel fired heat supply so as to characterize its performance under conditions similar to those which would be encountered in the Small Community Solar Thermal Power Experiment and to compare the results with performance predicted by computer simulations of the engine. Tests were conducted over a range of values of thermal input and steam temperature. Two tests were conducted at expansion ratios of 10/1, and one at expansion ratio of 14.4/1. The effect of temperature and power level variations was demonstrated. Engine efficiency was considered good although lower than projected by computer simulations. The effect of change in expansion ration was not demonstrated. One cylinder and two cylinder models were tested. each engine was then tested using steam generated in a solar receiver. (LEW)

20061 (DOE/JPL—1060-52, pp 147-177) **400-kW/sub e/ high-efficiency steam turbine for industrial cogeneration.** Leibowitz, H.M. (Mechanical Technology Inc., Latham, NY). 15 Jul 1982. NTIS, PC A15/MF A01.

From Parabolic dish solar thermal power annual program review; Atlanta, GA, USA (8 Dec 1981).

An advanced state-of-the-art steam turbine-generator has been developed to serve as the power conversion subsystem for the Solar Total-Energy Project in Shenandoah, Georgia. The turbine-generator, which is designed to provide 400-kW/sub e/ net electrical power, represents the largest turbine-generator that has thus far been built specifically for commercial solar-powered cogeneration. The controls for the turbine-generator incorporate a multiple, partial-arc entry to provide efficient off-design performance, as well as an extraction control scheme to permit extraction flow regulation while maintaining 110-psig pressure. Normal turbine operation is achieved while synchronized to a local utility and in a stand-alone mode. In both cases, the turbine-generator features automatic load control as well as remote start-up and shutdown capability. A four-stage, axial steam turbine rotates on a 42,450-rpm pinion to drive an 1800-rpm synchronous generator through a double-reduction gearbox. At the inlet throttle condition of 720°F, 700 psig, the turbine is designed to produce 400 kW/sub e/ and 2249 lb/hr of 110-psig extraction steam while consuming 8591 lb/hr of steam at the inlet throttle. In addition, the 6-psig exhaust steam is designed for use in an absorption chiller to provide 164 tons of plant air conditioning. The back-pressure turbine includes two high-pressure and two low-pressure stages separated by the 110-psig extraction port. Tests totaling 200 hours were conducted to confirm the integrity of the turbine's mechanical structure and control function. Performance tests resulted in a measured inlet throttle flow of 8450 lb/hr near design conditions. The successful completion of all structural, control and performance tests has produced a turbine-generator uniquely qualified for industrial cogeneration applications in the 500-hp class.

20062 (DOE/JPL—1060-52, pp 179-189) **Modifications and testing of a 4-95 Stirling engine for solar applications.** Nelving, H.G.; Percival, W.H. 15 Jul 1982. NTIS, PC A15/MF A01.

From Parabolic dish solar thermal power annual program review; Atlanta, GA, USA (8 Dec 1981).

A Stirling engine was modified by machining numerous holes and slots to form oil drain passages in the crankcase bulkheads and the gas compressor housing in order to provide adequate oil drain by gravity alone. The engine was then tested using helium working gas. After 130 hours of initial testing, the engine was performance tested for 25 hours, followed by 175 hours of endurance running. The engine was disassembled for inspection. Finally, tests were performed at the Advanced Components Test Facility, where record electrical power output was achieved and solar heat exchangers were tested successfully. (LEW)

20063 (DOE/JPL—1060-52, pp 191-200) **Dish Stirling system integration and test progress report.** Haglund, R.A. (Advanco Corp., El Segundo, CA). 15 Jul 1982. NTIS, PC A15/MF A01.

From Parabolic dish solar thermal power annual program review; Atlanta, GA, USA (8 Dec 1981).

The integration and check-out of the complete Dish Solar Stirling Thermal Power System at JPL's Parabolic Dish Test Site at Edwards Air Force Base, California is reported. The test program to demonstrate this full-up Dish Stirling Solar Thermal Electric System is well under way and the preliminary results of the tests conducted thus far are presented. The results are very encouraging and show promise of high performance and efficiency. The outstanding performance and durability of the 4-95 Stirling engine has been the highlight of this 6 month integration and test activity. Exposure to severe heat, dust, sand and wind during the summer months and heavy rains, high winds, inlcuding sand storms and freezing cold in recent months has not affected the engine or the receiver in any noticeable manner.

20064 (DOE/JPL—1060-52, pp 225-231) **French thermo-helio-electricity-kW parabolic dish program.** Audibert, M.; Peri, G. (Centre National de le Recherche Scintifique, Marseille, France). 15 Jul 1982. NTIS, PC A15/MF A01.

From Parabolic dish solar thermal power annual program review; Atlanta, GA, USA (8 Dec 1981).

The program reported aims to develop parabolic dish solar thermal power plants to produce thermal, mechanical, or electrical energy within the range of a few tens of thermal kW to some MW at a temperature up to 350°C. The design, construction, and experiments on two varients of laboratory prototype collectors to prove their feasibility are reported. Other efforts are reported that are aimed at starting industrialization of collectors and to design, build, and experience an installation featuring 10 collectors to produce process heat. Industrial applications are briefly discussed. (LEW)

20065 (DOE/JPL—1060-52, pp 257-282) **Garrett solar Brayton engine/generator status.** Anson, B. (Garrett Turbine Engine Co., Phoenix, AZ). 15 Jul 1982. NTIS, PC A15/MF A01.

From Parabolic dish solar thermal power annual program review; Atlanta, GA, USA (8 Dec 1981).

The solar advanced gas turbine (SAGT-1) is being developed for use in a Brayton cycle power conversion module. The engine is derived from the advanced gas turbine. The SAGT Program is presently funded for the design, fabrication and test of one engine. The engine, when mated with a solar receiver, is called a power conversion module (PCU). The PCU is scheduled to be tested on JPL's test bed concentrator under a follow-on phase of the program. Approximately 20 kW of electrical power will be generated.

20066 (DOE/JPL—1060-52, pp 283-293) **Application of the subatmospheric engine to solar thermal power.** 15 Jul 1982. NTIS, PC A15/MF A01.

From Parabolic dish solar thermal power annual program review; Atlanta, GA, USA (8 Dec 1981).

A natural gas-fired Brayton engine is described that is also a candidate for solar thermal power generation applications. The engine operates in a subatmospheric mode, that is, between atmospheric pressure and a partial vacuum. In the solar mode, the engine operates as a closed Brayton cycle engine referenced to ambient pressure through the open receiver. The designs of the turbocompressor, recuperator, and alternator, as well as advantages of this engine for simplifying the design of the solar receiver, are summarized. Engine power output and efficiency characteristics are predicted. (LEW)

20067 (DOE/JPL—1060-52, pp 319-328) **Configuration selection study for isolated loads using parabolic dish modules.** Revere, W.; Bowyer, J.; Fujita, T.; Awaya, H. (Jet Propulsion Lab., Pasadena, CA). 15 Jul 1982. NTIS, PC A15/MF A01.

From Parabolic dish solar thermal power annual program review; Atlanta, GA, USA (8 Dec 1981).

A configuration tradeoff study has been conducted to determine optimum solar thermal parabolic dish power systems for isolated load applications. The specific application of an essentially constant power demand as required for MX missile shelters is treated. Supplying a continuous level of power with high reliability is shown to require a power system comprising modular parabolic dish power units where the heat engines of the modular power units can be driven by fossil fuels as well as solar-derived heat. Since constraints on reliability result in the provision of a power generating capability that exceeds the constant demand level, efficient utilization of the power system requires battery storage. Tradeoffs regarding the optimum size of storage are investigated as a function of the number of power modules and the cost of the fossil fuel which is used to meet the demand when insolation is unavailable and storage is depleted.

20068 (SERI/TP—252-1775) **Evaluation of air-cooled central receivers.** Wright, J.D. (Solar Energy Research Inst., Golden, CO (USA)). Dec 1982. Contract AC02-77CH00178. 8p. (CONF-830405—5). NTIS, PC A02. Order Number DE83005130.

From 6. annual ASME technical conference on commercial building heating and cooling applications; Orlando, FL, USA (19 Apr 1983).

Air-cooled central receivers with metal tube absorbers are not competitive with other central receiver technologies. The cost of electricity produced by an air receiver operating at approximately 815°C (1500°F) coupled to a Brayton or combined cycle is 20 to 30% higher than that produced by draw salt or steam receivers coupled to steam Rankine power cycles. Similar results are found in cogeneration and industrial process heat applications. The higher cost and disadvantages of metal tube air-cooled receivers stem directly from the poor heat transfer characteristics of air and from the expensive metals required to fabricate the absorber tubes. Results of this study are used to define some of the requirements for higher temperature receivers to produce hot air.

20069 **(SERI/TR—251-1573) Research and development project evaluation and selection methods for the Solar-Thermal-Technology Program.** Krawiec, F. (Solar Energy Research Inst., Golden, CO (USA)). Feb 1983. Contract AC02-77CH00178. 58p. NTIS, PC A04/ MF A01. Order Number DE83008296.

The ranking of R and D options for long-term, high-payoff research and development in the Solar Thermal Technology Program is discussed considering the four general classes of ranking methods: economic, decision theory, constrained optimization, and scoring. The scoring method is proposed as the most suitable ranking technique to develop a balanced portfolio of R and D program elements. Procedure for implementation of the scoring method for Solar Thermal Technology Program activities evaluation and selection is outlined. Practical applicability of the scoring method to evaluate and select the Solar Thermal Research Program activities is demonstrated. The major conclusion is that the scoring method, augmented with the usbjective probabilistic risk assessment procedure, is the most suitable ranking technique to develop a balanced portfolio of R and D program elements.

20070 **Heat transfer from combustion gases to a single row of closely spaced tubes in a swirl crossflow Stirling engine heater.** Bankston, C.P.; Back, L.H. (Energy and Materials Research Section, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, California 91109). *Journal of Heat Transfer;* **104**: No. 1, 55-75(Feb 1982).

This paper describes an experimental program to determine the heat-transfer characteristics of a combustor and heat-exchange system in a hybrid solar receiver which utilizes a Stirling engine. The system consists of a swirl conbustor with a crossflow heat exchanger composed of a single row of 48 closely spaced curved tubes. In the present study, heat-transfer characteristics of the combustor/heat-exchanger system without a Stirling engine have been studied over a range of operating conditions and output levels using water as the working fluid. Non-dimensional heat-transfer coefficients based on total heat transfer have been obtained and are compared with available literature data. The results show significantly enhanced heat transfer for the present geometry and test conditions. Also, heat transfer along the length of the tubes is found to vary, the effect depending upon test condition.

1408 Ocean Thermal Gradient And Salinity Gradient Power Systems

REFER ALSO TO CITATION(S) 20012, 21465

20071 **(CONF-820814—41) OTEC plants for today's island market.** Niemann, R.; Davis, F.; Genens, L.; Hillis, D.; Panchal, C.; Sather, N.; Stevens, H.; Thomas, A. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 7p. NTIS, PC A02/MF A01. Order Number DE83008670.

From 17. Intersociety Energy Conversion Engineering conference; Los Angeles, CA, USA (8 Aug 1982).

Conceptual designs, incorporating existing technology, have been developed to satisfy the needs of today's island market for small OTEC power plants. The plants, intended for commercial application to power-distribution grids, incorporate operating procedures, component lifetimes, plant reliability and availability, and safety features commensurate with established electric-utility standards. The OTEC closed-cycle process was selected and applied to the design of shore-based plants of 1-, 5-, and 10-MWe capacities. Concepts of the power system, seawater system, and the overall power plant facility are presented. Plant design considerations are enumerated. Also presented are initial cost estimates and construction schedules along with the plant operating costs and the related cost of electricity based on plant cost, availability, and prevailing economic conditions.

20072 **(DOE/ET/20480—T1) 100- and 400-MW(e) large-scale floating OTEC platform conceptual designs. Final report.** (Gibbs and Cox, Inc., Arlington, VA (USA)). Feb 1982. Contract AC02-78ET20480. 574p. NTIS, PC A24/MF A01. Order Number DE83007894.

The design and integration of large scale floating OTEC platforms capable of generating 100 and 400 MW of electrical power for transmission to a shoreside power grid is reported. The various trade-off studies that evaluated the different systems of the OTEC plant are documented, and the two resulting configurations are described. A ship hull platform was chosen, as opposed to a spar or fixed tower. The platforms, cold water pipes, power systems, seawater systems, auxiliary systems, energy transfer system, and position control subsystems are detailed individually. Plant construction and deployment are discussed, and cost estimates are given. Technical details are appended, including blueprints, weight estimates, and environmental data. (LEW)

20073 **(N—8228782) Projected engineering cost estimates for an Ocean Thermal Energy Conversion (OTEC).** Gritton, E.C.; Hess, R.W.; Pei, R.Y. (RAND Corp., Santa Monica, CA (USA)). Jan 1982. 19p. (RAND/N—1788-RC). NTIS, PC A02/MF A01.

The potential cost reductions that might be achieved if certain engineering, construction and financial improvements were realized in the ocean thermal energy conversion concept were investigated. Six options were analyzed: water-side heat transfer enhancement (for tube-and-shell heat exchangers), plate type heat exchangers, fiberglass reinforced plastic cold water pipes, elmination of the requirement that the transmission cable be buried at ocean depths of less than 300 feet, a shorter construction period, and a reduced fixed charge rate. It was found that the changes having the most effect on capital cost are the two heat exchanger options and the shorter construction period. However, to achieve major reductions in capital cost, say on the order of 30 percent, a combination of one of the heat exchanger options in conjunction with the cold-water pipe, transmission cable and construction period options will be required.

20074 **(NP—3901549) OTEC: status and potential of private funding.** Francis, E.J.; Richards, D. (Johns Hopkins Univ., Laurel, MD (USA). Applied Physics Lab.). 1982. 30p. NTIS, PC A03/MF A01. Order Number DE83901549.

A financial analysis approach is described for calculating net present values and financial management rates of return for a wide variety of specific OTEC cases. Comparisons are made of the profit potentials, expected market penetration, perceived financial risks, and eventual benefits from the specific cases and logical follow-on construction scenarios. The principal factors of uncertainty as perceived by researchers, builders, and financiers are catalogued. Roles and responsibilities of participants in a financing approach including builder team, government, product user, financial houses, and investors are cited. Cases which have been investigated include 10 to 40 MW/sub e/ scale and 250 to 360 MW/sub e/ scale OTEC plants and plantships; electric power cabled ashore to US islands and the US mainland, methanol, ammonia, hybrid geothermal-OTEC plants for meeting local power demands or making products; and relevant data on other OTEC product possibilities.

20075 **(NP—3901550) Conceptual designs of a 100- and 400-MW large-scale OTEC platform: an update.** Deuchler, W.P.; Picha, K.G. Jr.; Hudon, T.J. (Gibbs and Cox, Inc., Arlington, VA (USA)). 1981. 32p. NTIS, PC A03/MF A01. Order Number DE83901550.

Through extensive trade-off studies, designs for OTEC plants producing 100 MW and 400 MW of electrical power have been developed. The OTEC platforms represent a total system integration approach rather than a simple combining of individually optimized subsystems. Factors considered in integrating these systems included subsystem performance, risk and cost. Final cost estimates for the platform are listed. These costs and platform designs represent configurations favorably suited for the Hawaiian, Kahe Point, site and are not necessarily optimized for other OTEC sites. They do, however, represent reasonable data points for large-scale platforms in general and illustrate a reasonable economy of scale expected of platforms of increasing power output.

20076 (NP—3901554) Environmental research for facilitating OTEC commercialization. Myers, E.P. (National Oceanic and Atmospheric Administration, Washington, DC (USA). Office of Ocean Minerals and Energy). 1982. 21p. Office of Ocean Minerals and Energy, National Oceanic and Atmospheric Administration, Washington, DC 20235.

In August, 1980, the National Oceanic and Atmospheric Administration (NOAA) was given the responsibility, per the Ocean Thermal Energy Conversion Act of 1980 (P.L. 96-320), to establish a legal regime that would foster the commercialization of ocean thermal energy conversion (OTEC) in a manner that protects the marine environment. NOAA developed both an EIS and an environmental effects research plan in accord with the requirements of the Act. These efforts, coupled with an assessment of past OTEC environmental research, highlight the following topics as being of high research priority: direct licensing requirements, and effects on fisheries. Cost-effective and timely research on these topics will be supportive of OTEC commercialization.

20077 (NP—3901555) OTEC: the government framework for development. Norling, R.D. (National Oceanic and Atmospheric Administration, Washington, DC (USA). Office of Ocean Minerals and Energy). 1982. 14p. Dept. of Commerce, National Oceanic and Atmospheric Administration, Office of Ocean Minerals and Energy, Washington, DC 20235.

The Ocean Thermal Energy Conversion Act of 1980 sets forth the basic rules of the OTEC legal regime and thus addresses legal uncertainties that had previously menaced the development of a commercial OTEC industry. The act establishes US jurisdiction over OTEC facilities and establishes a federal licensing system. Legal protection is extended to submarine electric transmission cables and equipment. The act makes applicable to OTEC facilities and plantships the Constitution, laws, and treaties of the US and the laws of the sthate to which an OTEC facility is connected. Specific determinations regarding the applicability or inapplicability to OTEC plants of various provisions of law also exist. Implementation of the act by NOAA is discussed, as well as additional considerations that OTEC developers need to keep in mind. (LEW)

20078 (SERI/TP—252-1853) Flash evaporation from turbulent water jets. Bharathan, D.; Penney, T. (Solar Energy Research Inst., Golden, CO (USA)). Feb 1983. Contract AC02-77CH00178. 14p. (CONF-830301—8). NTIS, PC A02/MF A01. Order Number DE83007311.

From ASME-JSME thermal engineering joint conference; Honolulu, HI, USA (20 Mar 1983).

Results of an experimental investigation of flash evaporation from turbulent planar and axisymmetric water jets are reported. In the range of jet thicknesses tested, for planar jets, due to shattering, evaporation is found to be nearly independent of the jet thickness. Evaporation from the planar jets was found to be dependent on the initial level of turbulence in the water supply manifold. An approximate analysis to model the evaporation process based on the physical phenomena and experimental observations is outlined. Comparisons between the experimental data and analytical predictions of the liquid temperature variation along the jet are included. Use of screens in the water jet are shown to be effective for enhancing evaporation.

1409 Solar Thermal Utilization

REFER ALSO TO CITATION(S) 19972, 19974, 19976, 20124, 20142, 20193, 20894, 20902, 20909, 20925, 20928, 22760

20079 (AD-A—115464/0) Solar energy applications at Army Ammunition Plants. Technical report. Lowry, A.P.; Moy, S.M. (Army Armament Research and Development Command, Dover, NJ (USA). Large Caliber Weapon Systems Lab.). Jun 1982. 46p. (ARLCD-TR—81038). NTIS, PC A03/MF A01.

The Army Ammunition Plants (AAPs) use significant quantities of fossil fuels. To reduce dependence on these scarce, costly, and non-renewable fuels, a study was conducted to investigate potential solar energy applications at the AAPs. Solar energy is a low-level energy source which is best applied to low temperature applications. It can be used at the AAPs to preheat boiler feedwater, provide hot air for dry-houses, provide domestic hot water and heat for administration buildings, and provide hot water for manufacturing processes such as metal cleaning, phosphating, and x-ray film processing. Use of flat plate collectors, evacuated tube collectors, or solar ponds with the possible addition of a heat pump, offers reasonably economical means of applying solar technology to AAP needs.

20080 (ANL/NESC—850) PASOLE; simulation of passive solar systems. McFarland, R.D. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048850.

Maxima of - 50 nodes 100 connections 1 control node Phase change storage is treated by use of temperature-dependent heat capacity. It is not convenient to handle heat-of-fusion as an isothermal enthalpy change. Internal reflections are not taken into account. For simulations in the southern hemisphere, changes to the solar angle and time equations are required. There are no restrictions on initial temperature conditions, but a small heat balance error will be observed if the initial temperatures are not in equilibrium.

PASOLE is a general simulation program for analyzing thermal performance of passive-solar heated buildings. Modeling is done using a general thermal network method that allows for heat sources and thermal storage. PASOLE can also be used to simulate hybrid or active solar heating systems. The user describes the thermal network model by specifying nodes that represent finite regions, connections between these nodes, and parameters associated with the nodes and connections. Sun position equations are used with a global-to-direct solar radiation correlation to develop solar heat sources from measured insolation data. The program includes built-in models of water-wall and masonry-wall versions of south-mass-wall type passive systems.CDC6600,7600;IBM360,370,3033; FORTRAN IV; NOS SCOPE (CDC6600), LTSS SCOPE(CDC7600), and OS/360(IBM360); PASOLE requires 110,000 (octal) words of program storage on a CDC6600, 60,000 (octal) words of program storage on a CDC7600, and 150K bytes of memory on an IBM3033.

20081 (ANL/NESC—907) SOLCOST3.0; solar heating & cooling design. Lantz, L.J. (Solar Environmental Engineering Co., Inc., Fort Collins, CO (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048907.

The SOLCOST solar energy design program is intended for sizing and evaluating several types of solar systems for residential and single-zone commercial buildings including service hot water and space heating systems using liquid or air collectors. Other systems incorporating heat pumps and absorption cooling are also available but are still being validated. The SOLCOST program computes an optimum solar collector area and tilt angle from an analysis of life cycle cost differences for a solar system versus a reference (conventional) HVAC system. This computation utilizes historical solar radiation and weather data for 336 cities to perform one day long computation for each month of the year. The program predicts the annual fraction of heating or cooling load provided by the solar system, the optimum collector area and tilt angle for the installation, and a detailed cash flow summary including payback and rate of return for the optimum collector area.CDC CYBER172,175; FORTRAN IV; NOS 1.3; 74,000 (octal) words of memory are needed to execute SOLCOST. The interactive input program requires 115,000 (octal) words of memory. However, by using the auxiliary subroutines included in the package, the interactive input program can be reduced to 65,000 (octal) words of memory.

20082 (BMFT-FB-T—81-164) The MIT Abu El Kom solar demonstration project in Egypt. Phase a: solar thermal installations. Final report, Mar. 1980. Reinmuth, F. (Kraftanlagen A.G., Heidelberg (Germany, F.R.)). Sep 1981. 71p. (In several languages). NTIS, PC A04/MF A01.

Maintenance-free solar installations were tested under unfavorable operating conditions in a village in Egypt. Thirty-five simple domestic hot water installations, designed as natural circulation systems of a collector surface of 2 sqm each and a 120 liter boiler mounted on the roof were examined. These installations were completely mounted and commissioned. The performance and efficiency of the systems were satisfactory.

20083 (BMFT-FB-T—81-165) **Comparison of concepts for solar-heated or solar-driven absorption and compression cooling machines for air conditioning and food preservation purposes, phase 1. Final report, Nov. 1978.** Grallert, H.; Herbricht, M.; Margulies, M. (Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (Germany, F.R.)). Sep 1981. 91p. NTIS, PC A05/MF A01.

For the cooling power range of about 10 to 500 kW and for cooling temperatures of +20, 0, and -20 C, a comparison was made between solar heated absorption machines and compression machines, which are driven by a solar heated Rankine cycle. Comparison criteria are C.O.P., energy prices, and application risks. All partial efficiencies and costs were determinated by component analyses. For several cooling loads an annual system simulation was performed using MBB computer programs. Furthermore, the electric energy demand for absorption cooling systems was estimated and initial application recommendations are given.

20084 (CONF-811034—2) **Operational results of National Solar Demonstration Projects.** Waite, E.V. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 8p. NTIS (US Sales Only). Order Number DE83007647.

From 2. national technical conference on earth sheltered buildings; Tulsa, OK, USA (16 Oct 1981).

Included in the National Solar Demonstration Program are examples of earth-sheltered, passive solar designs. The data obtained from these sites presents an interesting look at what is both technically and economically feasible. Data from four demonstration sites that are members of the National Solar Data Network are utilized to present an economic and technical analyses of a group of four sites. Three of these sites are earth sheltered residential structures, the fourth is a commercial passive structure. This sample of four demonstration sites is not intended to provide a statistical representation of passive earth sheltered structures, but rather, an example of the type of information available through the National Solar Data Program and how this information may be utilized.

20085 (CONF-821101—20) **Comparison of three years of performance for air-to-air parallel solar-heat-pump system in TECH House IV.** Reid, R.L.; Bedinger, A.F.G.; McGraw, B.A. (Tennessee Univ., Knoxville (USA)). 1982. 6p. Univ. of Tennessee, Mechanical and Aerospace Engineering Dept., Knoxville.

From ASME winter annual meeting; Phoenix, AZ, USA (14 Nov 1982).

A parallel solar-augmented heat-pump system has been experimentally evaluated in TECH House IV for three heating seasons between fall 1979 and spring 1982. Several changes were made in the operation of the system during the three year period. During 1979-1980, the use of on-peak purchased energy was minimized by charging the pebble bin in the off-peak period with a resistance duct heater. This configuration resulted in 83% of the purchased energy occurring in the off-peak period but the seasonal performance factor was only 1.61. During 1980-1981, the system was operated in the normal mode without the use of the off-peak heater. The seasonal performance factor then increased to 2.56. During 1981-1982, the mode of operation was the same as 1980-1981, but new outer cover sheets were installed and the inner cover sheet was eliminated resulting in a single glazed collector. The seasonal performance factor for the 1981-1982 season was measured to be 2.11.

20086 (DOE/AL/20601—T1) **Capitol Concrete Solar Industrial Process Heat Experiment. Final technical report, May 30-November 24, 1982.** Hauger, J.S.; Pond, S.L. (Applied Concepts Corp., Woodstock, VA (USA)). 31 Jan 1983. Contract AC04-82AL20601. 94p. NTIS, PC A05/MF A01. Order Number DE83007189.

The nation's first point focussing solar industrial process heat plant was designed, installed, and operated for evaluation at Capitol Concrete Products. The solar collector, which was designed and fabricated by PKI, was incorporated into a plant to provide steam for curing concrete blocks in an autoclave at pressures of 15 to 60 psig. The plant was operated for a four month period of technical evaluation (July 26-November 24, 1982), subsequent to final check out testing.

20087 (DOE/CS/30007—T1) **Solar preheating of both domestic hot water and space. Final technical report for the Sea Loft restaurant in Long Branch, New Jersey.** (Sea Loft Restaurant, Long Branch, NJ (USA)). 28 Nov 1982. Contract FC01-77CS30007. 97p. NTIS (US Sales Only). Order Number DE83004719.

Stephen Giddio's Sea Loft Restaurant in Long Branch, NJ is equipped with an active solar system for preheating water for both space heating and domestic hot water. Three pumped water loops, each a closed circuit, transfer heat from one major component to another. Solar heat is collected by an array of 83 evacuated tube collectors. The acceptance test results are appended, as well as the operational and maintenance manual. Reference CAPE-2805. (LEW)

20088 (DOE/ID/12341—T1) **Vacuum distillation of fuel alcohol using solar energy. Final report.** Holden, M.L.; Smith, T.F. (Iowa Univ., Iowa City (USA). Div. of Energy Engineering). 30 Nov 1982. Contract FG07-81ID12341. 117p. NTIS, PC A06/MF A01. Order Number DE83008249.

Solar assisted distillation of ethanol fuel is examined by building, calibrating, and operating a pilot plant. First, the pilot plant was desingned and built with the components of solar collector, thermal energy storage tank, distillation unit, and data acquisition and control systems. Next, the instruments and control loops were calibrated to ensure accurate and repeatable measurements. Finally, experiments using solar energy and electric energy determined technical performance and feasibility of solar assisted distillation. Experiments determined representative temperatures, pressures, flow rates, and product composition. Comparison of solar and electric energy experiments determined the effect of solar energy varying over the period of one day and effects due to passing clouds. Experimental results indicate solar assisted distillation of ethanol fuel is technically feasible.

20089 (DOE/JPL—1060-52, pp 119-121) **PKI solar thermal plant evaluation at Capitol Concrete Products, Topeka, Kansas.** Hauger, J.S. (Applied Concepts Corp., Reston, VA); Borton, D.N. 15 Jul 1982. NTIS, PC A15/MF A01.

From Parabolic dish solar thermal power annual program review; Atlanta, GA, USA (8 Dec 1981).

Applied Concepts Corporation is supporting JPL in the structure and implementation of a system feasibility test to determine the technical and operational feasibility of using the PKI collector to provide industrial process heat. The test is of a PKI system in an industrial test bed plant at Capitol Concrete Products in Tokeka, Kansas, with an experiment control at Sandia National Laboratories, Albuquerque (SNLA). Plant evaluation will occur during a year-long period of industrial utilization. It will include performance testing, operability testing, and system failure analysis. Performance data will be recorded by a data acquisition system. Reporting will be completed monthly, with results presented as per standard SERI format. User, community, and environmental inputs will be recorded in logs, journals, and files. Applied Concepts' and PKI's engineering staff will be responsible to diagnose and correct any plant failures. Plant installation, start-up, and evaluation, are anticipated for late November, 1981. The data acquisition system and reporting methods have been tested during verification testing at SNLA.

20090 (DOE/JPL—1060-52, pp 207-223) **Point focusing collector for an integrated water/power complex.** Zewen, H. (Messerschmitt-Boelkow-Blohm, Munich, Germany); Schmidt, G.; Moustafa, S. 15 Jul 1982. NTIS, PC A15/MF A01.

From Parabolic dish solar thermal power annual program review; Atlanta, GA, USA (8 Dec 1981).

The utilization potential of the point focusing parabolic dish is identified in the areas of process heat generation, electricity generation, ad cogeneration. Main design parameters are summarized. Collector performance tests are described, as well as an application as primary energy source in a food/water/power complex. (LEW)

20091 (DOE/NBM—3008145) Analytical and experimental analysis of procedures for testing solar domestic hot-water systems. NBS Building Science Series 140. Fanney, A.H.; Thomas, W.C.; Scarbrough, C.A.; Terlizzi, C.P. (National Bureau of Standards, Washington, DC (USA)). Feb 1982. 161p. NTIS, PC A08/MF A01 - GPO. Order Number DE83008145.

A repeatable test method independent of outdoor environmental conditions and laboratory geographical location is required in order to provide a means by which solar domestic hot water systems may be rated and compared. Three experimental techniques which allow the net thermal output of an irradiated solar collector array to be reproduced indoors without the use of a solar simulator are investigated. These techniques include use of an electric heat source only, use of a nonirradiated collector array in series with an electric heat source, and the use of electric strip heaters which are attached to the back of nonirradiated absorber plates. Expressions are developed to compute the input power required for each experimental technique. Solar collectors connected in parallel and series combinations are considered. All three test techniques were shown to reproduce the outdoor daily collector array thermal output within four percent. Two of the techniques allow the actions of the circulator controller for an outdoor irradiated system to be duplicated indoors. One technique applies to solar hot water systems which operate on the thermosyphon principle. Experiments conducted to determine the effect of storage tank temperature stratification on system performance for a single-tank direct solar hot water system are described. Several return tube designs were fabricated and tested to determine the influence of thermal stratification on system performance. An analytical model for a single-tank direct hot water system is developed. The model is used to support parametric studies for the thermal performance characteristics which result from the use of each test method to duplicate the net theral output of an irradiated array. The model is also used to assess thermal performance differences which occur due to indoor versus outdoor environmental conditions.

20092 (EUR—7695-EN) Dutch solar pilot test facility. Galen, E. van; Ouden, C. den. (Commission of the European Communities, Luxembourg). 1982. 85p. Available from Commission of the European Communities, Luxembourg.

The main aim for the first phase of the research work was the construction of a pilot test facility (PTF), consisting of two solar subsystems each including amongst others an array of flat plate collectors, a storage tank and an interface simulating the behaviour of a heat distribution system in a house. Furthermore a series of checks have been performed on the operational quality of the test facility and during a few weeks the operation of the facility according to an agreed programme has been proven.

20093 (EUR—7704/III-EN) Presentation of the software for central control system 1 of the solar pilot test facilities. Vol. 3. (Commission of the European Communities, Luxembourg). 1982. 69p. Available from Commission of the European Communities, Luxembourg.

The complete programme necessary for the PTF is divided into two parts: initializations intervene at each start-up of the installation, and, for normal operation, the real-time programme is the governing procedure.

20094 (EUR—7706-FR) Pilot Test Facility (P.T.F.). Colomes, J.; Ployart, R.; Roland, S.; Salichon, M. (Commission of the European Communities, Luxembourg). 1982. 87p. (In French). Available from Commission of the European Communities, Luxembourg.

The experiment named PTF (Pilot Test Facility) and funded by the EEC (European Economic Community), is taking place simultaneously in 8 countries of the community. The dwelling is simulated by a microprocessor and a hydraulic interface, which extract energy from the experimental installations. A first reference installation (PTF 1) is of an identical design in all the participating countries. A second installation (PTF 2) allows each country to test, compare and extrapolate original designs. The COSTIC not= not= coordinates the unfolding of the PTF experiment. The C.E.A., which is the subcontractor for FRANCE, installed PTF (1 and 2) at its experimental solar test site at CADARACHE, where other complete systems are tested and compared to models (thermodynamics, desalination, storage, refrigeration...). PTF 1 has been operating since April 1979. Before undertaking a continuous testing programm, the accent has been placed on characterizing each component. Certain hydraulic modifications have had to be carried out. Characterization of the collector array is in agreement with the constructor (DRU) curve. PTF 2 has been operating since July 1979. The principal theme is the thermal management of an interseasonal storage associated with a short term storage. Outside organizations have been sought for: - selective collector arrays - organic fluids - storage using emulsion of a phase changing material - auxilliary storage heating with an aerogenerator. The test to characterize the components are in progress. The CEA computer model ORIENT has been normalized to some of the operating modes of PTF 2. The computer model SIMUL which simulated residential buildings is operational for PTF 1 and in the process of adaptation for PTF 2.

20095 (EUR—7707-EN) United Kingdom solar pilot test facility. Potter, I.N.; Lawrance-Owen, P.N.; Booth, W.B. (Commission of the European Communities, Luxembourg). 1982. 104p. Available from Commission of the European Communities, Luxembourg.

This report describes the development, design, construction and initial trials of a laboratory facility for the validation of mathematical models and systems studies of solar heating systems for houses.

20096 (EUR—7711-EN) Study and evaluation of the latent cooling potential of chemical de-humidifiers. Campbell, J.; Lush, D.M.; Moss, J.G.G. (Commission of the European Communities, Luxembourg). 1982. 85p. Commission of the European Communities, Luxembourg.

Studies to establish the practical application of solar energy to the field of latent cooling by dehumidificationare discussed, with ancillary applications when the solar collection capacity exceeds the cooling requirements. The studies are to be directed towards the production of criteria, systems and evaluation techniques to determine the viability of using solar energy in this field. For convenience, the elements of the studies are categorised into three phases which may be conducted simultaneously in part or in whole in order to facilitate the co-ordination of the elements.

20097 (LA-UR—83-3) Evaluating the performance of passive-solar-heated buildings. Balcomb, J.D. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 8p. (CONF-830405—9). NTIS, PC A02/MF A01. Order Number DE83006047.

From 6. annual ASME technical conference on commercial building heating and cooling applications; Orlando, FL, USA (19 Apr 1983).

Methods of evaluating the thermal performance of passive-solar buildings are reviewed. Instrumentation and data logging requirements are outlined. Various methodologies that have been used to develop an energy balance for the building and various performance measures are discussed. Methods for quantifying comfort are described. Subsystem and other special-purpose monitoring are briefly reviewed. Summary results are given for 38 buildings that have been monitored.

20098 (LA-UR—83-359) Guidelines for conservation levels and for sizing passive-solar collection area. Balcomb, J.D. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 26p. (CONF-830217—1). NTIS, PC A03/MF A01. Order Number DE83007550.

From Milford event meeting; Milford, PA, USA (19 Feb 1983).

Guidelines are given for selecting R-values and infiltration levels, and determining the size of the solar collection area for passive solar building. The guidelines are based on balancing the incremental cost/benefit of conservation and solar strategies. Tables are given for 209 cities in the US and the results are also displayed on maps. The procedures are developed in an appendix, which gives the cost assumptions used and explains how to develop different guidelines for different costs.

20099 (N—82-25164) Place of solar thermal rockets in space. Selph, C.C. (Air Force Rocket Propulsion Lab., Edwards AFB, CA (USA)). May 1981. 24p. NTIS PC $60.50/ MF $60.50.

In APL The 1981 JANNAF Propulsion Meeting, Vol. 2 p 265-288 (SEE N82-25149 15-99) REFS.

The harnessing of sunlight for propulsive energy is a recurring theme in space propulsion, particularly for applications requiring large velocity increments, such as planetary exploration or comet rendezvous. Characteristically, it is viewed in terms of the solar sail and the solar cell, but for operations in Earth orbit these approaches are less desirable because the very low thrust leads to undesirably long maneuver times. Thrust levels several orders of magnitude higher are available with solar thermal rockets, while preserving a specific impulse advantage over chemical systems. The performance advantages, penalties, technological problems, and approaches were examined for solar thermal rockets. Its suitability in several Earth orbit missions is assessed. The peculiarities of vehicle design, the nature of the thruster and the solar concentrator are presented, and AF plans to implement the development of solar rockets are outlined.

20100 (NP—3901149) Simulation-program validation using domestic hot-water-system data. Joergensen, O. (Danmarks Tekniske Hoejskole, Lyngby. Lab. for Varmeisolering). Aug 1982. 114p. Dep. NTIS (US Sales Only), MF A01. Order Number DE83901149.

System performance data for four domestic hot water systems were distributed to program participants from Belgium, Denmark, Germany, Italy, Japan, the Netherlands, Spain, Sweden, Switzerland, United Kingdom, United States, and the Commission of the European Communities. The data consisted of 10-minute values for August 1978. Later, one additional week of data (from August 1981) was also distributed for one of the systems for a second round of validation. A parameter sensitivity analysis for one of the systems, to extend the validation spot-check of models, was also repeated. In both cases the results improved drastically in the second round. The parameter sensitivity analysis established that not all the models were applicable for investigation of the impact of collector flow rate and control strategy variations. (LEW)

20101 (PB—82-243833) Advanced solar/gas desiccant cooling system. Final report. Huskey, B.; Sharp, J.; Venero, A.; Yen, H. (Exxon Corp., Florham Park, NJ (USA). Energy Venture Development Group). Feb 1982. 89p. NTIS, PC A05/MF A01.

The results are documented of a research and development effort to produce a desiccant cooling system with significantly higher thermal efficiency than current state-of-the-art desiccant systems. The report findings and data are based on extensive computer modeling and actual operating test results of an experimental breadboard unit employing a totally new approach. For the separation of moisture from an airstream using solid desiccants (silica gel). The results confirmed the theoretical concept of efficiency improvement over present desiccant concepts and validated the computer model used for sizing and simulating the desiccant process. The results also identified specific components and areas of the system needing improvements such as air seals, wheel drive mechanisms, air distribution and materials.

20102 (SERI/TP—234-1785) Thermochemical energy transport in a 1-MW industrial-process-heat solar system. Nix, R.G. (Solar Energy Research Inst., Golden, CO (USA)). Jan 1983. Contract AC02-77CH00178. 5p. (CONF-830405—7). NTIS, PC A02. Order Number DE83005128.

From 6. annual ASME technical conference on commercial building heating and cooling applications; Orlando, FL, USA (19 Apr 1983).

A small, industrial-process-heat application employing parabolic-dish solar collectors was studied for feasibility using various energy-transport processes. The system delivers 3.6 GJ/h (1 MW, 3.14 MBtu/h) to a single user as 4.14 MPa (600 psig), 400°C (750°F) superheated steam. The dish field and the user were separated by a distance of 0.4 km (0.25 mi). Energy transport was either by thermochemical reaction or by direct sensible energy using either steam or molten draw salt. Thermochemical energy systems investigated included CO_2 reforming of CH_4, dissocation of SO_3, and dissociation of NH_3. Both storage and nonstorage situations were considered; storage was accomplished by a two-tank molten draw salt system, regardless of the energy transport method.

20103 (SERI/TP—252-1869) Long-duration thermal storage for solar-thermal high-pressure steam IPH. Copeland, R.J.; Stern, C.; Leach, J.W. (Solar Energy Research Inst., Golden, CO (USA); California Univ., Berkeley (USA); North Carolina State Univ., Raleigh (USA)). Dec 1982. Contract AC02-77CH00178. 7p. (CONF-830405—6). NTIS (US Sales Only). Order Number DE83005127.

From 6. annual ASME technical conference on commercial building heating and cooling applications; Orlando, FL, USA (19 Apr 1983).

Solar-thermal central-receiver systems are cost effective for electric-power and industrial process-heat applications. Systems employing molten nitrate salt as both receiver working fluid and storage have previously been evaluated for diurnal thermal storage. This study evaluates the potential of employing a molten salt receiver for a baseload industrial process plant requiring saturated steam at 68 atm (1000 psi). Two types of thermal storage are evaluated: molten salt, and air and rock. When thermal storage of six hours or less is used, molten nitrate salt alone is the optimum storage. For more than six hours, the optimum storage is a combination of molten salt and air and rock. The air and rock system uses a molten-salt-to-air heat exchanger and a thermocline rock bed heated and cooled by the air. The economic potential of the system is determined. The results depend on the relative cost of fossil fuel and the solar thermal energy costs. The optimum quantity of storage is highly variable, and the range is from no storage to a long duration capacity - 48 hours.

20104 (SERI/TP—253-1830) Detailed design procedure for solar industrial-process-heat systems: overview. Kutscher, C.F. (Solar Energy Research Inst., Golden, CO (USA)). Dec 1982. Contract AC02-77CH00178. 9p. (CONF-830405—13). NTIS, PC A02. Order Number DE83005298.

From 6. annual ASME technical conference on commercial building heating and cooling applications; Orlando, FL, USA (19 Apr 1983).

A large number of handbooks have been written on the subject of designing solar heating and cooling systems for buildings. One of these is summarized here. Design Approaches for Solar Industrial Process Heat Systems, published in September 1982, addresses the complete spectrum of problems associated with the design of a solar IPH system. A highly general method, derived from computer simulations, is presented for determining actual energy delivered to the process load. Also covered are siting and selection of subsystem components, cost estimation, safety and environmental considerations, and installation concerns. An overview of the design methodology developed is given and some specific examples of technical issues addressed are provided.

20105 (SERI/TP—253-1831) Development of SOLIPH - a detailed computer model of solar industrial-process-heat systems. Kutscher, C.F. (Solar Energy Research Inst., Golden, CO (USA)). Dec 1982. Contract AC02-77CH00178. 10p. (CONF-830405—14). NTIS, PC A02. Order Number DE83005301.

From 6. annual ASME technical conference on commercial building heating and cooling applications; Orlando, FL, USA (19 Apr 1983).

In an effort to generate design tools for solar`thermal applications to industrial process heat, the need to develop a detailed computer model which could simulate hot water and steam systems (unfired boiler and flash tank) was recognized. Developing the program resulted in a model suited to specific needs and led to a better understanding of the algorithms used and assumptions made. SOLIPH (for SOLar Industrial Process Heat) is a quasi-steady-state, hour-by-hour model. For each hour of the year, climatological data are read from a TMY (Typical Meteorological Year) weather tape. Outputs are supplied on an hourly, daily, and monthly basis with a cumulative summary for the year. Before making thousands of SOLIPH runs to generate design tools, SOLIPH was verified against other computer models. In mid-1980 the SSEA working group of ASME proposed an IPH system sample problem to allow comparison of various codes. Results from TRNSYS and DOE-2 (CBS) agreed well. The same system was modeled SOLIPH and the results showed excellent agreement.

20106 **(SERI/TP—253-1871) Simple energy-calculation method for solar industrial-process-heat steam systems.** Gee, R. (Solar Energy Research Inst., Golden, CO (USA)). Jan 1983. Contract AC02-77CH00178. 11p. (CONF-830405—16). NTIS (US Sales Only). Order Number DE83007214.

From 6. annual ASME technical conference on commercial building heating and cooling applications; Orlando, FL, USA (19 Apr 1983).

Designing a solar industrial-process heat (IPH) system, sizing its components and predicting its annual energy delivery requires a method for calculating solar system performance. A calculation method that is accurate, easy to use, accounts for the impact of all important system parameters, and does not require use of a computer is described. Only simple graphs and a hand calculator are required to predict annual collector field performance and annual system losses. The energy-calculation method is applicable to a variety of solar-system configurations. The calculation method applied only to parabolic-trough steam-generation systems that do not employ thermal storage is described. Both flash tank and unfired-boiler steam systems are covered.

20107 **(SERI/TP—254-1732) Evaluation of solar domestic-hot-water control systems.** Farrington, R. (Solar Energy Research Inst., Golden, CO (USA)). Dec 1982. Contract AC02-77CH00178. 6p. (CONF-830405—3). NTIS, PC A02. Order Number DE83005110.

From 6. annual ASME technical conference on commercial building heating and cooling applications; Orlando, FL, USA (19 Apr 1983).

Literature on solar domestic hot water (SDHW) control systems was reviewed to assess results of control system performance and reliability. Seven SDHW control systems underwent six tests. Both the literature review and the testing indicate serious concerns with SDHW control system performance and reliability.

20108 **(TVA/OP/ECR—82/39(9-11)) Nashville solar-water-heater demonstration project. Monitoring-data analysis. Interim report, September 1981-November 1981.** (Tennessee Valley Authority, Chattanooga (USA). Div. of Energy Conservation and Rates). Mar 1982. 60p. NTIS, PC A04/MF A01. Order Number DE83900173.

Presented are the three months of field monitoring data that were collected for the Nashville Solar Water Heater Demonstration Project from September through November of 1981. Twenty-six solar domestic water heaters were monitored during September, 35 during October, and 37 during November. Homeowners were audited to assure adequate solar access, and each selected a solar water heating system from an approved list. Once installed, the system would be inspected for compliance with TVA guidelines. Two-tank and one-tank systems are included. The monitoring sample technique and monitoring system are described. The collected data were analyzed by computer to produce daily and monthly total summaries for each site. The performance of each site was assessed comparing: total energy saved by the solar system, solar system savings percentage, and the energy multiplier. (LEW)

20109 **(TVA/OP/ECR—82/39(12-2/82)) Nashville Solar-Water-Heater Demonstration Project. Monitoring data analysis interim report, December 1981-February 1982.** (Tennessee Valley Authority, Knoxville (USA). Div. of Energy Conservation and Rates). May 1982. 61p. NTIS, PC A04/MF A01. Order Number DE83900174.

Thermal performance data from the Nashville Solar-Water-Heating Demonstration project for the period December 1, 1981 through February 28, 1982 are presented. Because solar-water-heater performance is strongly related to weather conditions, results from this report cannot be extrapolated to apply for an annual evaluation. In addition, the number of sites presently being monitored does not constitute a representative sample size. Therefore, this report does not draw conclusions or propose solutions. Both directly measured and derived performance indicators for each calendar month for the average system are tabulated.

20110 **(TVA/PUB—83/17) Evaluation of solar-assisted heat pumps and solar house. Final report, June 1, 1977-September 30, 1981.** (Tennessee Univ., Knoxville (USA)). 1981. 100p. NTIS, PC A05/MF A01. Order Number DE83900714.

Both series and parallel solar augmented heat pump systems were installed and evaluated at the Tennessee Energy Conservation in Housing (TECH) Center in Knoxville, Tennessee. In addition, computer simulation programs were developed and verified from the experimental performance data. Parametric studies were then carried out investigating the effect of potential design changes on system performance. Economic studies were also done. The experimental performance was compared to other instrumented houses at the TECH center and elsewhere in the United States having solar systems, stand alone heat pumps, and annual storage heat pumps.

20111 **(CAPE—2805) Solar preheating of both domestic hot water and space. Final technical report for the Sea Loft restaurant in Long Branch, New Jersey (Engineering Materials).** (Sea Loft Restaurant, Long Branch, NJ (USA)). 28 Nov 1982. Contract FC01-77CS30007. TIC. Order Number DE83006509.

Stephen Giddio's Sea Loft Restaurant in Long Branch, NJ is equipped with an active solar system for preheating of both Space and Domestic Hot Water (DHW). Three pumped water loops, each closed circuit, transfer heat from one major equipment component to another. The closed loop drain back solar energy collection circuit uses a 3/4 horsepower pump to circulate seventeen gallons per minute of deionized water from the Solar Storage Tank to the Solar Collector Array, and return. This tank has a capacity of 600 gallons. The solar array consist of eighty-three evacuated tube type concentrating collectors. The heat gathered in this circuit is stored in the tank for either simultaneous or future use in either or both of the Space and DHW preheating loops. The preheating of city water prior to its entrance into the gas fired 86 gallon DHW heater is accomplished in a separate 600 gallon capacity tank. Two thirty-five square foot tubed heat exchanger bundles inserted into this tank accept solar heated hot water from the Solar Storage Tank. This solar heated water is pumped at sixteen GPM in a closed loop circuit using a 1/4 HP pump. The preheating of restaurant space is accomplished in a closed loop circuit between the Solar Storage Tank and an eight SF hot water coil inserted into the return air from the Main Dining Room of the restaurant. A 1/4 HP pump circulates fifteen gallons of solar heated hot water per minute. This system incorporates a differential temperature controller that utilizes a multitude of pressure sensors and temperature thermistors located throughout the various portions of the system components and piping. The Display Board mounted on the wall of the Bar-Lounge Area serves to integrate the entire solar system. It not only displays the flow but houses the Btu flowmeters, Digital temperature readouts, and HVAC EMS Programmer. Reference DOE/CS/30007-T1.

20112 **First phase of the solar pilot test facility project.** Nielsen, C. Luxembourg; Commission of the European Communities (1982). 38p. (EUR—7702-EN). .

A proposal of constructing a solar pilot test facility was made in 1977. The project has two purposes: 1. To be able to construct full scale solar energy systems and carry out measurements which can be used for validation of computer programmes. 2. To get a tool which can be used for developing and testing new types of solar energy systems.

20113 **Detailed design of construction of the Solar Pilot Test Facilities. Vol. 2.** Luxembourg; Commission of the European Communities (1982). 240p. (EUR—7704/II-EN). .

The detailed design of construction of a Solar Pilot Test Facility in eight European countries are presented.

20114 **Conception, construction and validation of the solar pilot test facilities. Vol. 1.** Luxembourg; Commission of the European Communities (1982). 150p. (EUR—7704/I-EN). .

In 1977, the Commission of the European Communities decided that a part of their future programme on solar energy research would be to support a project having as its initial objective the validation of computer programs to model the performance of solar heating systems in houses. At that time, very little reliable validation data was available, most of which derived from tests carried out on a limited number of installations in trial houses or from laboratory tests on individual system components. The staff of the European Commission decided that the best solution to the problem was to carry out validation tests using a laboratory installation which has since become known as a Pilot Test Facility (PTF). This consists of a real solar system complete with its collectors, storage, controls and piping, with the solar collectors subject to actual weather conditions and the system load provided by a simulator capable of producing a typical house load interactive with the weather conditions.

20115 **(CAPE—2773) Feasibility study for a solar greenhouse at the Columbus Zoo (Engineering Materials).** (Columbus Zoological Gardens, Powell, OH (USA)). 1982. Contract FG02-81R510323. TIC. Order Number DE83004991.

20116 **Passive solar architecture in Europe.** Lebens, R.M. (ed.). London, England; Architectural Press Ltd. (1981). 173p. (EUR—7291-EN-EP). European Community Information Service, 2100 M Street, NW, Suite 707, Washington, DC 20037.

The book starts with a basic technical introduction to the possible categories of passive solar heating and cooling and expands this with case studies of existing European passive solar buildings. The eleven prize-winning schemes are then presented in full, together with photographs of the models which the winners were invited to build for the exhibition. Following the section on the prizewinners come sections for each of the following: Commendations, Special Mentions and Other Details of Interest. Each of these sections is prefaced by a key map and the entries are then numbered to comply with this key. Finally there is a catalog of all the entrants whose work was included in the Brussels exhibition. The section which follows the entries contains the reports of the judging committee, the technical assessors' committee and the organisers. The appendices include a full set of the documents sent to each competitor.

20117 **(CAPE—2769) Integrated solar heating, cooling and hot water system for the San Diego City Schools, University City High School (Engineering Materials).** (San Diego Unified School District, CA (USA)). [nd]. Contract FC03-77CS31499. TIC. Order Number DE83005780.

The solar system consists of a heating circuit, two 200-ton absorption chiller hot water circuits and a hot water tube bundle circuit combined with solar collection and storage loops into a single integrated thermal system. Gas fired boilers provide backup and load peaking. Solar collection is provided by three types of panels located on a south facing hill from top to bottom are as follows: parabolic tracking concentrating reflectors, 7680 ft^2; parabolic fixed concentrating reflectors, 7364 ft^2; and fresnel lens concentrating, tracking, 2488 ft^2. The storage capacity is 88,800 gallons in 3 steel tanks. Reference DOE/CS/31499-T2.

20118 **(CAPE—2765) Solar heating system for office/warehouse buildings: piping and ductwork drawings (Engineering Materials).** (Big Green Investments, Denver, CO (USA)). [nd]. Contract FC03-78CS32125. TIC. Order Number DE83005735.

The building includes 2840 ft^2 of offices on two floors and 2360 ft^2 of full-height warehouse. The solar heating system consists of solar air heaters and rock bed heat storage. The drawings include HVAC and plumbing, fire dampers, mechanical room layout, and elevations. Reference DOE/CS/32125-T1. (MHR)

1410 Solar Collectors And Concentrators

REFER ALSO TO CITATION(S) 19973, 20056, 20069, 20092

20119 **(BMFT-FB-T—81-156) High efficient collector for small solar-powered facilities. final report.** Obermayr, E.; Molt, W.; Schneller, D.; Speidel, K. (Dornier-System G.m.b.H., Friedrichshafen (Germany, F.R.)). Sep 1981. 100p. (In several languages). NTIS, PC A05/MF A01.

A series of preliminary investigations and laboratory tests were performed as a basis for developing a new type of solar collector. The vacuum flat plate collectors are actually evaporators, where the working medium is evaporated within the collector itself. Prototypes of direct evaporation collectors were constructed and tested. In the temperature range seen for this application (130 - 150 C), the collector efficiency is about 40 - 50 percent.

20120 (DOE/JPL—1060-52, pp 3-13) **Development status of the PDC-1 parabolic dish concentrator.** Sobczak, I.F. (Ford Aerospace & Communications Corp. (FACC), Newport Beach, CA); Pons, R.L.; Thostesen, T. 15 Jul 1982. NTIS, PC A15/MF A01.

From Parabolic dish solar thermal power annual program review; Atlanta, GA, USA (8 Dec 1981).

The status of development of the 12 m. diameter parabolic dish concentrator (PDC-1) which is planned for use with the Small Community Solar Thermal Power System is summarized. The PDC-1 unit features the use of plastic reflector film bonded to structural plastic gores supported by front-bracing steel ribs. An elevation-over-azimuth mount arrangement is employed, with a conventional wheel-and-track arrangement; outboard trunnions permit the dish to be stored in the face down position, with the added advantage of easy access to the power conversion assembly.

20121 (DOE/JPL—1060-52, pp 15-20) **Acurex parabolic dish concentrator (PDC-2).** Overly, P.; Bedard, R. (Acurex Corp., Mountain View, CA). 15 Jul 1982. NTIS, PC A15/MF A01.

From Parabolic dish solar thermal power annual program review; Atlanta, GA, USA (8 Dec 1981).

The work reported is to design, fabricate, install, and test a cost-effective point-focus solar concentrator. The key to concentrator cost effectiveness is proper design of the reflector surface panels. The Low-Cost Concentrator reflective surface design is based on the use of a thin, backsilvered mirror glass reflector bonded to a molded structural plastic substrate. This combination of reflective panel material offers excellent optical performance at low cost. The design approach, rationale for the selected configuration, and the development status are briefly discussed. Reflective panel development and demonstration results are also presented.

20122 (DOE/JPL—1060-52, pp 21-24). **PKI collector.** Rice, M.P. (Power Kinetics, Inc., Troy, NY). 15 Jul 1982. NTIS, PC A15/MF A01.

From Parabolic dish solar thermal power annual program review; Atlanta, GA, USA (8 Dec 1981).

System characteristics, design improvements, and manufacturing advances of the PKI solar collector system are reviewed. There are three primary subsystems: concentrator, receiver/fluid loop, and controls. The concentrator is of a faceted Fresnel reflector design composed of 864 one foot square flat silvered glass mirrors. The mirrors are arranged in columns which are ganged together and rotated through their centers of gravity to provide elevation tracking. Azimuthal tracking is accomplished by rotation of the entire structure from east to west. A parallel tube steel heat exchanger is mounted at the concentrator focal area in a well insulated, galvanized steel housing. Automatic two axis tracking and operational control is provided with a microprocessor based package. Concentrator-mounted shadowbands are the basis of active tracking. A software program provides azimuthal tracking during cloudy periods so that collection can begin immediately upon reappearance of the sun. The collector is capable of operating unattended thanks to safety features, microprocesor control, and reliability of the system. (LEW)

20123 (DOE/JPL—1060-52, pp 25-34) **Thin film concentrator panel development.** Zimmerman, D.K. (Boeing Engineering and Construction Co., Seattle, WA). 15 Jul 1982. NTIS, PC A15/MF A01.

From Parabolic dish solar thermal power annual program review; Atlanta, GA, USA (8 Dec 1981).

It is shown that a thin film reflective surface is acceptable for use on solar concentrators, including 816°C (1500°F) applications. In addition, it is shown that a formed steel sheet substrate is a good choice for concentrator panels. The concept selected and described here uses a thin reflective film adhesively bonded to the structurally stiffened formed steel sheet substrate to form a concentrator gore. A description of the design, fabrication and evaluation of two test panels is presented.

20124 (DOE/JPL—1060-52, pp 115-118) **Verification testing of the PKI collector at Sandia National Laboratories, Albuquerque, New Mexico.** Hauger, J.S.; Pond, S.L. (Applied Concepts Corp., Reston, VA). 15 Jul 1982. NTIS, PC A15/MF A01.

From Parabolic dish solar thermal power annual program review; Atlanta, GA, USA (8 Dec 1981).

Verification testing of the PKI collector was undertaken prior to its operation as part of an industrial process heat plant at Capitol Concrete Products in Topeka, Kansas. Testing was performed at a control plant installed at Sandia National Laboratory, Albuquerque, New Mexico (SNLA). Testing was conducted in two phases to test short-term system performance characteristics and to validate system design, manufacture, and installation through operability testing. Early results show that plant performance is even better than anticipated and far in excess of test criteria. Overall plant efficiencies of 65 to 80 percent were typical during hours of good insolation. A number of flaws and imperfections have been detected during operability testing, the most important being a problem in elevation drive alignment due to a manufacturing error. All problems were corrected as they occurred and the plant, with over 40 hours of operation, is currently continuing operability testing in a wholly-automatic mode.

20125 (DOE/JPL—1060-52, pp 233-246) **High-temperature ceramic heat exchanger element for a solar thermal receiver.** Strumpf, H.J.; Kotchick, D.M.; Coombs, M.G. (AiResearch Manufacturing Co., Torrance, CA). 15 Jul 1982. NTIS, PC A15/MF A01.

From Parabolic dish solar thermal power annual program review; Atlanta, GA, USA (8 Dec 1981).

A study has been performed on the development of a high-temperature ceramic heat exchanger element to be integrated into a solar receiver producing heated air. A number of conceptual designs were developed for heat exchanger elements of differing configuration. These were evaluated with respect to thermal performance, pressure drop, structural integrity, and fabricability. The fabrication analysis was performed. The final design selection identified a finned ceramic shell as the most favorable concept. The shell is surrounded by a larger metallic shell. The flanges of the two shells are sealed to provide a leak-tight pressure vessel. The ceramic shell is to be fabricated by an innovative combination of slip casting the receiver walls and precision casting the heat transfer finned plates. The fins are bonded to the shell during firing. The unit is sized to produce 2150°F air at 2.7 atm pressure, with a pressure drop of about 2 percent of the inlet pressure. This size is compatible with a solar collector providing a receiver input of 85 kW(th). Fabrication of a one-half scale demonstrator ceramic receiver has been completed.

20126 (DOE/JPL—1060-52, pp 247-255) **Ceramic high temperature receiver design and tests.** Davis, S.B. (Sanders Associates, Inc., Nashua, NH). 15 Jul 1982. NTIS, PC A15/MF A01.

From Parabolic dish solar thermal power annual program review; Atlanta, GA, USA (8 Dec 1981).

A study is reported that examined tradeoffs for 80 kW air Brayton receivers for use on a parabolic dish concentrator and was extended to provide for the design, fabrication, and test of a receiver. Design features of the ceramic high temperature receiver and its performance are discussed. (LEW)

20127 (DOE/R5/10141—T1) **Recycling for solar applications. Final report.** (Crosby Gardens, Toledo, OH (USA)). Nov 1982. Contract FG02-79R510141. 19p. NTIS, PC A02/MF A01. Order Number DE83006597.

The original objective of the reported work was to make solar collectors from appliances recovered from solid waste. Obtaining an appliance for the purpose of recycling into a collector was found to be difficult. A workshop was held to construct two solar collectors. Benefits of the program are listed, and workshop evaluations and P.R. materials are attached. (LEW)

20128 (LA-UR—83-325) **Daily results of the initial operation of the Los Alamos salt-gradient solar pond.** Hedstrom, J.C.; Jones, G.F.; Meyer, K.A. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 15p. (CONF-830129—1). NTIS, PC A02/MF A01. Order Number DE83007543.

From Solar pond workshop group meeting; Chattanooga, TN, USA (25 Jan 1982).

The results of analysis of the initial data obtained on the Los Alamos National Laboratory salt-gradient solar pond, a 232 m^2 pond constructed for the primary purpose of studying pond hydrodynamics, are presented. The pond and the data-acquisition system were complete and in full operation by August 14, 1982. By September 21, 1982, the lower convecting zone had reached a temperature of 56°C. An energy balance was performed over this period and is presented. Soil conductivity determinations have been made from the data, and the method is discussed. As a result of a leak discovered in the pond in September, a method of determining the leak rate was developed, and the results are included.

20129 (N—82-25296) **Optical characterization of solar concentrator mirrors using the solar beam of the JPL 25-foot space simulator.** Argoud, M.J.; Dennison, E.W. (Jet Propulsion Lab., Pasadena, CA (USA)). 1982. 19p. NTIS, PC A15/MF A01.

In NASA. Goddard Space Flight Center 12th Space Simulation Conf. 19 p (SEE N82-25291 16-18).

The Jet Propulsion Laboratory 25-foot space simulator with its 5.8-m (19-ft) diameter simulated solar beam provides an excellent facility for measuring the optical characteristics of parabolic solar concentrator panels and gores. The virtual source position and size were determined by using a single lamp of the 37 xenon 30-kW source array with only the center lens in the 19-channel optical mixer. This data was used to define the optical test geometry, and it allowed accurate measurement of focal length and surface deviations of the mirror under test. A flux distribution of a typical solar concentrator placed directly on the solar beam gives measurements of performance at the focal point of the parabolic surface.

20130 (NP—3901007) **Interaction of electromagnetic radiation and micro-structured matter with respect to the generation of spectral selective solar absorbers.** Scherber, W. (Stuttgart Univ. (Germany, F.R.). Fakultaet Elektrotechnik). 19 Oct 1981. 144p. (In German). NTIS (US Sales Only), PC A07/MF A01. Order Number DE83901007.

This work is the investigation of selective layers of the type of structure filters. In the theoretical part the principles for the computation of the spectral absorption properties of structural filters are worked out.The method of approach is to test empirically different solution approaches and models for their suitability and to combine them in a modified or extended shape to form a completeness. Two complementary ways of views are represented as a result. The computed absorption spectra are compared with measurements of prepared structural filters in the experimental part. A review is given on the technology of structural filters and own developments are represented. The newly discovered electrochemical and thermal production methods are interesting startingpoints for technical applications. Finally, the theory is used to emphasize the optical quantities of solar absorbers and their parametric dependences. This way important informations on the influence of material choice, particle dimensioning, morphology is visible directly.

20131 (PB—81-235053) Dimensions, Volume 65, Number 3. (National Bureau of Standards, Washington, DC (USA)). Apr 1981. 29p. NTIS, PC A03/MF A01.

This monthly magazine features short summaries of major technical developments, highlights of work in progress, major speeches and statements by Bureau management, and a listing of NBS publications. Topics discussed are issue swinging to the Earth's tilt, testing for technical competence, physics at the measurement limits, new parameter proposed for fracture toughness, evaluation of solar collector cover plates, and improved modeling of cement and concrete, fire development in basement rooms, and generation and measurement of DC electric field with space charges.

20132 (SAND—82-1970C) Antireflection pyrex envelopes for parabolic solar collectors. McCollister, H.L.; Pettit, R.B. (Sandia National Labs., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 25p. (CONF-830405—18). NTIS, PC A02/MF A01. Order Number DE83008183.

From 6. annual ASME technical conference on commercial building heating and cooling applications; Orlando, FL, USA (19 Apr 1983).

Parabolic trough solar collectors utilize glass envelopes around the receiver tube in order to reduce thermal losses. Antireflective (AR) coatings applied to the envelope can potentially increase the solar transmittance by 0.07. An excellent AR surface can be formed on Pyrex (Corning Code 7740 glass) by first heat treating the glass to cause a compositional phase separation. After heat treating, a surface layer is removed using a pre-etch solution of aqueous ammonium bifluoride. Finally the AR layer is formed by etching in a solution containing hydrofluorosilic and ammonium bifluoride acid. Processing parameters studied included the phase separation temperature and heat treatment time, the pre-etch time, and the etching bath temperature and time. AR-coated samples with solar transmittance values >0.97, as compared to a value of 0.91 in untreated samples, were obtained for a range of heat treatment temperatures from 560 to 630°C. The phase separation time and temperature interact so that at 630°C short times are required (3 hours) while at 560°C longer times are necessary (24 hours). Optimum values for the other processing parameters are 12 to 18 minutes in the pre-etching bath, and 5 to 10 minutes in the film forming bath when maintained between 35 and 45°C. Application of this process to full scale 3 m long x 6 cm diameter Pyrex envelopes was successful in producing solar transmittance values ≧ 0.97.

20133 (SAND—82-7109) Development and fabrication of solar-collector SMC reflector assemblies. Kirsch, P.A. (Budd Co., Fort Washington, PA (USA). Technical Center). Dec 1982. Contract AC04-76DP00789. 46p. NTIS, PC A03/MF A01. Order Number DE83008308.

This project produced a parabolic trough solar collector array consisting of four each 2 x 6 m reflector modules. Each module required a structural torque tube on which were mounted six 1 x 2 m molded sheet molding compound (SMC)/glass panels. The project reported here established the fabrication, assembly, and inspection procedures for production of SMC reflector panels and assemblies.

20134 (SAND—83-1060C) Sol-gel derived AR coatings. Brinker, C.J.; Pettit, R.B. (Sandia National Labs., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 13p. (CONF-830316—1). NTIS, PC A02/MF A01. Order Number DE83007031.

From Distrubuted solar collector conference; Albuquerque, NM, USA (15 Mar 1983).

Porous sol-gel derived films prepard from aged polymeric solutions were deposited on PYREX and etched to produce AR coatings with solar averaged transmittance values greater than 0.97. This process appeared to produce single layer interference films rathr than graded index films.

20135 (SERI/TP—253-1839) Development of a consensus standard for determining thermal performance of high-concentration-ratio solar collectors. Blackmon, J.B.; Linskens, M.C.; Reed, K.A. (Solar Energy Research Inst., Golden, CO (USA); McDonnell Douglas Corp., Huntington Beach, CA (USA); National Bureau of Standards, Washington, DC (USA)). Dec 1982. 7p. (CONF-830405—8). NTIS, PC A02. Order Number DE83005129.

From 6. annual ASME technical conference on commercial building heating and cooling applications; Orlando, FL, USA (19 Apr 1983).

A description is presented of a consensus standard test method, developed by the ASTM Solar Energy Committee, for determining the thermal performance of concentrating solar collectors. The method applies to outdoor testing of one or two axis concentrating collectors which heat fluids for use in thermal systems and whose design is such that the effects of diffuse sky irradiance is negligible (i.e., performance can be characterized in terms of direct irradiance as measured with pyrheliometers). The procedures determine the optical response of the collector for various angles of incidence of solar radiation, and the thermal performance of the collector at various operating temperatures for the condition of maximum optical response. The method requires quasi-steady state conditions, measurement of environmental parameters, and determination of the fluidmass flow rate-specific heat product and temperature difference of the heat transfer fluid between the inlet and outlet of the collector. These quantities determine the rate of heat gain for the solar irradiance condition encountered. Thermal performance is then determined as the rate of heat gain of the collector relative to the solar power incident on the plane of the collector aperture.

20136 (SERI/TP—253-1870) Direct steam generation in line-focus solar collectors. May, E.K.; Murphy, L.M. (Solar Energy Research Inst., Golden, CO (USA)). Jan 1983. Contract AC02-77CH00178. 10p. (CONF-830405—12). NTIS, PC A02. Order Number DE83006030.

From 6. annual ASME technical conference on commercial building heating and cooling applications; Orlando, FL, USA (19 Apr 1983).

The performance benefits of the direct (in situ) generation of steam in the receiver tube of a line-focus solar collector are assessed. Compared to existing technology using steam-flash or unfired boiler systems, the in situ technique could produce 25% more steam at a reduced delivery cost. The analysis indicates that two-phase flow instabilities, if present, can be readily controlled, and that the possibility of freezing is not an impediment to using water in cold climates.

20137 (SERI/TP—253-1893) Testing of a prototype Fresnel-lens concentrator for thermal applications. Lewandowski, A. (Solar Energy Research Inst., Golden, CO (USA)). Feb 1983. Contract AC02-77CH00178. 8p. (CONF-830405—17). NTIS, PC A02/MF A01. Order Number DE83007312.

From 6. annual ASME technical conference on commercial building heating and cooling applications; Orlando, FL, USA (19 Apr 1983).

A prototype Fresnel-lens concentrator, manufactured by E-Systems, Dallas, Texas, was tested for thermal performance at SERI's Mid-Temperature Collector Research Facility (MTCRF). This work was funded by the DOE in an effort to support development of a testing standard for concentrators. The data obtained from this testing were presented and utilized by a subcommittee of the American Society for Testing and Materials (ASTM) in the development process for the standard. Several tests were conducted on the concentrator using draft versions of the standard as guidance. Additional tests allowed but not required by the standard were conducted to determine the effect of the direct solar irradiance level on collector performance. It is the results of these additional tests that are of primary interest. The data show that non-linear heat losses cause collector efficiency to be a function of both Δt/I/sub DN/ and I/sub DN/ and that the efficiency when fluid temperature is near ambient is also a function of I/sub DN/. This latter result is a characteristic unique to this collector, whereas the former holds for any collector with non-linear with heat loss.

20138 (SERI/TR—253-1833) **Conceptual design of the Truscott Brine Lake solar pond system. Volume II. Utility-integrated scenario.** May, E.K.; Leboeuf, C.M.; Waddington, D. (Solar Energy Research Inst., Golden, CO (USA)). Dec 1982. Contract AC02-77CH00178. 87p. NTIS, PC A05/MF A01. Order Number DE83008133.

Conceptual designs were developed for salt-gradient solar pond systems to provide pumping power for chloride control in the Red River Basin. Energy is extracted from six, 10.5-ha (26-acre) solar ponds for conversion to electricity using three organic Rankine cycle turbines. The solar pond system is located in a brine impoundment lake at Truscott, Texas. Low-salinity brine flowing into this lake is concentrated by natural evaporation to form the solar pond, and is also used for solar pond maintenance. Two operating scenarios were investigated. A continuous base load system could deliver 9.8 GWh/yr at an output of 1120 kW to the utility electric grid for an estimated capital expenditure of $12.8 million. A system operating only from June through September would cost $21.2 million for an annual energy delivery of 7.7 GWh at a net output during the operating period of 2640 kW.

1420 Heat Storage

REFER ALSO TO CITATION(S) 20103, 20737

20139 (BMFT-FB-T—81-050) **Development of a modular heat exchanger with integrated latent heat energy store. Final report, Dec. 1979.** Abhat, A.; Heine, D.; Heinisch, M.; Malatidis, N.A.; Neuer, G. (Institut fuer Kerntechnik und Energiewandlung e.V., Stuttgart (Germany, F.R.)). Feb 1981. 247p. (In several languages). NTIS, PC A11/MF A01.

Latent heat storage materials and appropriate heat exchangers for solar heating applications, such as house heating and domestic hot water production were investigated. The melting and freezing characteristics and the effects of thermal cycling on a total of 12 substances, including paraffins, fatty acids and salt hydrates, were investigated and their corrosive interaction with five conventional construction materials was determined. The poor thermal conductivity of the heat storage materials requires the development of a modular finned heat pipe heat exchanger with increased heat transfer characteristics. A cost analysis is provided and comparisons with hot water storage indicate that latent heat storage has the potential of becoming economically more attractive than the former for domestic hot water production.

20140 (BMFT-FB-T—81-149) **Investigation of medium and high temperature phase change materials for thermal energy storage. Final report, Apr. 1980.** Heine, D.; Heess, F.; Steiner, D. (Institut fuer Kerntechnik und Energiewandlung e.V., Stuttgart (Germany, F.R.)). Aug 1981. 110p. (In several languages). NTIS, PC A06/MF A01.

Investigations in the temperature ranges 200 to 450 C and 700 to 900 C, are reported. These investigations comprise the corrosion of structural materials together with promising storage materials and the thermal stability and the melting and freezing behavior of the storage materials. The mass losses of sheet metal samples were measured from the corrosion tests, and thickness reduction and corrosion rate were calculated. The corrosion type was determined using microscopes. Furthermore, melting and freezing curves were continually measured during cycling tests. The thermal stability of the storage materials was thereby determined as a function of the melting and freezing properties. The combinations mild steel with $NaNO_3$, boiler steel with $KCl-ZnCl_2$, $NaNO_3$ and $MgCl_2$-$NaCl$, and $NICu_{30}Fe$ with $KCl-ZnCl_2$ were found to be compatible in the temperature range 200 to 450 C.

20141 (DOE/JPL—1060-52, pp 35-47) **Transmittance-optimized, point-focus fresnel lens solar concentrator.** O'Neill, M.J.; Goldberg, V.R.; Muzzy, D.B. (E-Systems, Inc., Dallas, TX). 15 Jul 1982. NTIS, PC A15/MF A01.

From Parabolic dish solar thermal power annual program review; Atlanta, GA, USA (8 Dec 1981).

A point-focus Fresnel lens solar concentrator for high-temperature solar thermal energy system applications is discussed. The concentrator utilizes a transmittance optimized, short focal length, dome shaped refractive Fresnel lens as the optical element. An 11-meter diameter concentrator has been designed and is expected to provide an overall collector efficiency of about 70% at an 815°C receiver operating temperature and a 1500X geometric concentration ratio. The Fresnel concentrator development program is presented, including a description of the concentrator, a summary of its expected performance, results of optical and thermal analyses of the collector, a discussion of manufacturing methods for making the large lens, and an update on the current status and future plans of the development program. (LEW)

20142 (EUR—7699-EN) **Development of a thermal storage system based on the heat of absorption in hygroscopic materials.** Verdonschot, J.K.M.; den Ouden, C. (Commission of the European Communities, Luxembourg). 1982. 58p. Available from Commission of the European Communities, Luxembourg.

The main aims of the research work were the development of a heat storage system using a solid adsorbent as storage medium and to study the behaviour of such a heat storage system as a component of a total air-based solar heating system. In order to develop such a storage system several solid adsorbing materials have been examined and based on experimental tests of the water adsorbing capacity, heat of adsorption, velocity of adsorption and desorption reactions as well as other criteria, the solid adsorbing agent called 'Sorbead-R' has been selected for a first prototype heat storage system. The results of the measurement of various properties of these hygroscopic materials are used in a total system study. This study is carried out with the use of a computer simulation model describing the interaction between the components of a solar heating installation in terms of actual hourly heat flows during one year. A storage system optimization is realised with a reference solar heating installation and a veritable adsorbent heat storage volume. The result of this study was a guideline for the design of a prototype heat storage system. This reaction vessel, filled with 400 kg of Sorbead-R, has a heat capacity of 350 MJ (approx. equal to 100 kWh, air humidity 5 gr/kg) which is comparable to a rock bed storage system of 5 m^3 (temperature range 20-80°C). This reaction vessel has been tested in a specially constructed testcircuit with respect to heat storage capacity, fill time, heat removal capability, thermal gradient and moisture content gradient.

15 GEOTHERMAL ENERGY

20143 (PB—82-221433) **The evaluation of the Communities' geothermal energy, production and utilization of hydrogen, and systems analysis: development of models R and D sub-programmes. Research evaluation report no. 2.** Barten, A.P.; Brown, D.A.; Chadwick, A.T.; Farinelli, U.; Roersch, A. (Commission of the European Communities, Luxembourg). [nd]. 94p. NTIS, PC AE05/MF E05.

The results of the Community's first RandD program in the fields of geothermal energy, production and utilization of hydrogen, and systems analysis were evaluated. A pragmatic approach was followed; evaluation criteria included the energy value (or potential value) of the results, their scientific and technological value, their possible contribution to the Community's social and economic development and their fostering of international cooperation.

1501 Resource Status And Assessment

20144 (DOE/ET/27014—T4) **1979-1980 Geothermal Resource Assessment Program in Washington.** Korosec, M.A.; Schuster, J.E. (Washington Div. of Geology and Earth Resources, Olympia (USA)). 1980. Contract AC07-79ET27014. 294p. NTIS, PC A13/MF A01. Order Number DE83000906.

Separate abstracts were prepared for seven papers. Also included are a bibliography of geothermal resource information for the State of Washington, well temperature information and locations in the State of Washington, and a map of the geology of the White Pass-Tumac Mountain Area, Washington. (MHR)

20145 (DOE/ET/28365—T2) **Colorado's hydrothermal resource base: an assessment.** Pearl, R.H. (Colorado Geological Survey, Denver (USA)). 1979. Contract AS07-77ET28365. 154p. NTIS, PC A08/MF A01. Order Number DE83006663.

As part of its effort to more accurately describe the nations geothrmal resource potential, the US Department of Energy/Division of Geothermal Energy contracted with the Colorado Geological survey to appraise the hydrothermal (hot water) geothermal resources of Colorado. Part of this effort required that the amount of energy that could possibly be contained in the various hydrothermal systems in Colorado be estimated. The findings of that assessment are presented. To make these estimates the geothermometer reservoir temperatures estimated by Barrett and Pearl (1978) were used. In addition, the possible reservoir size and extent were estimated and used. This assessment shows that the total energy content of the thermal systems in Colorado could range from 4.872 x 10^{15} BTU's to 13.2386 x 10^{15} BTU's.

20146 (LBL—13600, pp 105-107) **Evaluation of the hydrothermal potential of the Ashdod Area, Israel.** Benson, S.M. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

The Earth Sciences Division has recently become involved in a project to evaluate the hydrothermal potential in and around Ashdod, Israel. The US Agency for International Development (AID) is evaluating the hydrothermal potential of this area because a seawater desalination plant being constructed in Ashdod will have large requirements for a low-grade heat source. The objective of this evaluation is to determine if the hydrothermal resource at Ashdod is of suitable temperature, brine chemistry, size, and productivity to economically replace the existing heat source for the plant. It is estimated that approximately 2100 m^3/hr of 95°C brine will be required to replace the existing heat source.

1502 Geology And Hydrology Of Geothermal Systems

REFER ALSO TO CITATION(S) 20144

20147 (DOE/ER/10763—2) **Depth to and concentrations of water in large bodies of silicic magma. Progress report, July 1, 1982-June 30, 1983.** Anderson, A.T. (Chicago Univ., IL (USA)). 3 Mar 1983. Contract AC02-80ER10763. 5p. NTIS, PC A02/MF A01. Order Number DE83008082.

Large bodies of silicic magma are potential sources of geothermal energy and ore. They also pose threats of catastrophic eruptions. The depths of such bodies are related to their economic potential and probably to their eruption mechanisms. The concentrations of water in the magmas are important for their eruptive and dynamical behavior and for the development of ores. Estimates of viscosity and density of melt require knowledge of concentration of water. The concentration of water in melt before ascent and eruption can be measured in inclusions of glass which became trapped in crystals before extrusion. The depth of a magma body can be estimated or delimited if we can find out the concentrations of both carbon dioxide and water in the inclusions of glass. Initial results on the Bishop Tuff of Long Valley Caldera, California yield 4.9 +- 0.5 percent H_2O for glass included in quartz from the Plinian air fall pumice. This result is comparable to the estimates of Hildreth (1977) of about 3.5 to 4.9 percent H_2O in the lowermost part of the Bishop ash flow. From January 1982 through December 1982, analyses of inclusions of glass in two additional quartz phenocrysts from the Plinian air fall unit of the Bishop Tuff revealed variable H_2O and CO_2. The corresponding partial pressures range between about 2000 and 5000 atmospheres, assuming gas saturation. The variation may be natural or caused by an analytical artifact. A computerized data file has been constructed to facilitate the storage and retrieval of published and unpublished chemical analyses of glasses and minerals. Some data on the Bishop Tuff are presently stored.

20148 (EGG—2239) **Prickett and Lonnquist aquifer simulation program for the Apple II minicomputer.** Hull, L.C. (EG and G Idaho, Inc., Idaho Falls (USA)). Feb 1983. Contract AC07-76ID01570. 25p. NTIS, PC A02/MF A01. Order Number DE83008120.

The Prickett and Lonnquist two-dimensional groundwater model has been programmed for the Apple II minicomputer. Both leaky and nonleaky confined aquifers can be simulated. The model was adapted from the FORTRAN version of Prickett and Lonnquist. In the configuration presented here, the program requires 64 K bits of memory. Because of the large number of arrays used in the program, and memory limitations of the Apple II, the maximum grid size that can be used is 20 rows by 20 columns. Input to the program is interactive, with prompting by the computer. Output consists of predicted lead values at the row-column intersections (nodes).

20149 (LA—9625-HDR) **Candidate sites for future hot-dry-rock development in the United States.** Goff, F.; Decker, E.R. (Los Alamos National Lab., NM (USA)). Dec 1982. Contract W-7405-ENG-36. 40p. NTIS, PC A03/MF A01. Order Number DE83007103.

Generalized geologic and other data are tabulated for 24 potential hot dry rock (HDR) sites in the contiguous United States. The data show that HDR resources occur in many geologic and tectonic settings. Potential reservoir rocks at each prospect are described and each system is cateogrized accoridng to inferred heat sources. The Fenton Hill area in New Mexico is discussed in detail because this region may be considered ideal for HDR development. Three other prospectively valuable localities are described: The Geysers-Clear lake region in California, the Roosevelt Hot Springs area in Utah, and the White Mountains region in New Hampshire. These areas are singled out to illustrate the roles of significantly different geology and geophysics, reservoir rocks, and reservoir heat contents in possible HDR developments.

20150 (LBL—13600, pp 113-115) **Modeling of fracture reservoirs.** Pruess, K.; Narasimhan, T.N.; Bodvarsson, G.S. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

Most geothermal reservoirs are highly fractured systems. The fractures provide conduits through which fluid (and heat) can flow at rates which are sufficiently large to be of commercial interest. Traditional approaches to geothermal reservoir evaluation and analysis have employed a porous medium approximation, which amounts to assuming instantaneous (thermal and hydrologic) equilibrium between fractures and matrix. A new numerical modeling technique, termed the Multiple Interacting Continua Method (MINC), has been developed which treats transient fluid and heat flow within the matrix and fractures.

20151 (LBL—13600, pp 133-138) **Overview of the Mexican-American cooperative program at the Cerro Prieto Geothermal Field.** Lippmann, M.J.; Zelwer, R. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

The Lawrence Berkeley Laboratory (LBL) is coordinating the US technical activities being carried out at Cerro Prieto under a five-year agreement between the US Department of Energy (DOE) and the Comision Federal de Electricidad de Mexico (CFE). This agreement, signed in July 1977, is expected to expire in July 1982. Efforts are being made to continue some of the research beyond the formal termination of the agreement. This paper described the program.

20152 (LBL—13600, pp 138-141) **Geologic model of the Cerro Prieto Geothermal Field.** Halfman, S.E.; Howard, J.H.; Vonder Haar, S.P. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

One of the tasks under the Mexican-American cooperative agreement is the comprehensive geologic study of the Cerro Prieto geothermal field. Using logs from over seventy deep wells as the basic source of information on the subsurface geology, a working model of the Cerro Prieto geothermal field is being developed.

20153 (USGS/MAP/I—1297) **Geologic map of the Crater Springs Known Geothermal Resources Area and vicinity, Juab and Millard Counties, Utah.** Galyardt, G.L.; Rush, F.E. (Geological Survey, Reston, VA (USA)). 1981. 21p. USGS, Box 25286 - Federal Center, Denver, CO 80225.

1503 Geothermal Exploration And Exploration Technology

REFER ALSO TO CITATION(S) 20144, 22031

20154 (DOE/ET/27010—1) **McCoy Area, Nevada geothermal reservoir assessment case history - Northern Basin and Range. Final report, 1 October 1978-30 September 1982.** Pilkington, H.D. (AMAX Exploration, Inc., Golden, CO (USA)). Oct 1982. Contract AC08-79ET27010. 76p. NTIS, PC A05/MF A01. Order Number DE83008083.

The McCoy geothermal prospect is located in north-central Nevada at the junction of the Augusta Mountains, Clan Alpine Mountains and the New Pass Range. Geothermal exploration on the prospect consisted of an integrated program of geologic, geochemical and geophysical studies. The geochemical studies included hydrogeochemistry, soil geochemistry, and drill cuttings geochemistry. Geophysical exploration included heatflow studies, aeromagnetic, self-potential, gravity, passive seismic, dipole-dipole resistivity, electromagnetic and magnetotelluric surveys. Exploration drilling includes fifty-two (52) shallow thermal gradient holes and five (5) intermediate depth temperature gradient wells. Shallow low-temperature geothermal reservoirs were encountered in two areas. In the McCoy Mine area the resource was found in the Permo-Pennsylvanian rocks. In the southern part of the prospect a resource with temperatures of 100°C was encountered in the basal conglomeratic sandstone of the Triassic section.

20155 (LBL—13600, pp 86-88) **Inferred conductivity distribution in the vicinity of Mount Hood, Oregon, based on the interpretation of magnetotelluric and telluric data.** Mozley, E.C.; Goldstein, N.E. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

Magnetotelluric and telluric measurements were acquired in the vicinity of Mount Hood, Oregon, as part of a program to evaluate the geothermal potential of this stratovolcano located in the High Cascade Range of northern Oregon. The survey area is characterized by rugged topography ranging from deeply eroded valleys surrounding the valcano, with elevations as low as 2000 ft, to the volcanic peak itself, with an elevation of 11,235 ft. The field procedure for data acquisition was to occupy four stations simultaneously and thus obtain a five-component magnetotelluric measurement supplemented by two remote telluric vector measurements and one remote two-component magnetic measurement. The data were processed using the auto-power and cross-spectral estimates obtained via the fast Fourier transform algorithm.

20156 (LBL—13600, pp 88-90) **In-field processing and magnetotellurics with the EM-60 electromagnetic system.** Wilt, M.; Goldstein, N.E.; Haught, J.R.; Labson, V.; Morrison, H.F. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

In 1977, Lawrence Berkeley Laboratory and the Engineering Geosciences group at the University of California, Berkeley, designed and constructed the EM-60 electromagnetic system for use in intermediate-depth geothermal exploration. This system has been used with excellent success for geothermal exploration and crustal studies and has proved to be effective even in areas of complex geology or rugged local terrain. Although the original system required an excessive amount of post-field-processing for data interpretation and was incapable of proper on-site data evaluation for quality control, significant improvements have been made during the past year. The EM-60 system now allows for in-field data processing and on-site calculation of apparent resistivity. The modifed system also allows for the possibility of simultaneous measurements of controlled-source (dipole) electromagnetic and magnetotelluric (MT) soundings.

20157 (LBL—13600, pp 90-91) **Deep electromagnetic sounding in the Basin and Range Province.** Wilt, M.; Goldstein, N.E.; Haught, J.R.; Morrison, H.F. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

During the spring of 1981, a deep electromagnetic (EM) sounding survey was undertaken in the northern Basin and Range Province by Lawrence Berkeley Laboratory (LBL). The purposes of the project were (1) to confirm the presence of deep conductive bodies first detected with magnetotelluric measurements, (2) to investigate the geometry of these bodies, and (3) to test the LBL controlled-source EM system (EM-60) as modified to perform deep sounding work. These deeply buried conductors may have important tectonic implications; if they consist of partially molten rock, they could be the heat source of the numerous hot springs and geothermal systems in northern Nevada.

20158 (LBL—13600, pp 92-95) **Simple one-dimensional inversions of magnetotelluric data.** Goubau, W.M. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

The exact solution to the one-dimensional inverse problem in magnetotellurics was first derived by Weidelt. Often it is much more desirable to find an approximate inverse that can be computed rapidly. The most commonly used simple inverse is one proposed by Bostick. Bostick's algorithm is concise enough that it can be evaluated with a pocket calculator, and in many cases it yields an inverse that reflects all of the essential features of the true inverse. This report presents alternative inversion schemes that are derived from Maxwell's equations and that can, in principle, be made more accurate.

20159 (LBL—13600, pp 99-102) **Advances in transient well-testing methodology.** Miller, C.W.; Benson, S.M.; Bodvarsson, G.S. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

A major problem in determining the transmissivity and storativity of a geothermal reservoir is that in most cases the flow in the reservoir is two-phase. Conventional well-test methods are primarily applicable to isothermal, single-phase reservoirs. One of the tasks in fiscal 1981 was to understand the effects of two-phase wellbore flow on pressure transient tests and to determine appropriate testing and analysis procedures. Analysis methods for injection tests data in a fractured two-phase reservoir were also studied.

20160 (LBL—13600, pp 102-104) **Low- to moderate-temperature hydrothermal reservoir engineering research.** Benson, S.M.; Solbau, R.; Bodvarsson, G.S. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

In 1981 a new program was established at Lawrence Berkeley Laboratory to develop reservoir engineering methodology and reservoir assessment techniques specific to low- and moderate-temperature hydrothermal systems. The new program focused on developing a computational model for thin fault-charged hydrothermal reservoirs, development of well-testing instrumentation, compiling and publishing case studies of low- to moderate-temperature reservoirs, and writing a handbook with reservoir engineering guidelines for potential developers.

20161 (LBL—13600, pp 118-121) **Subsidence modeling of the Pleasant Bayou geothermal geopressured region.** Goyal, K.P.; Narasimhan, T.N.; Vonder Haar, S.P. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

The Pleasant Bayou prospect, a geothermal geopressured area, is located in Brazoria County, Texas. Deltaic sandstones of the Frio Formation, at a depth of about 14,000 ft (4.27 km), are found to have potential for a geothermal geopressured reservoir. Two exploratory wells have been drilled by the US Department of Energy (DOE), with a separation of 500 ft. The Pleasant Bayou area is part of a deep sedimentary basin traversed by growth faults. For purposes of subsidence modeling, a circular area with a radius of 5 miles and centered at the DOE wells is considered.

20162 (LBL—13600, pp 122-124) **Fluid sampling and analysis of geopressured brine.** Hansen, L.; Galbraith, R.M.; Weres, O.; Michel, M.; Sverjensky, D. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

Economic assessment of the low-temperature geopressured brines found in certain Gulf Coast formations requires knowledge of their methane content and a clear understanding of their geochemistry. In support of the Gas Research Institute (GRI) and the Department of Energy (DOE), the Lawrence Berkeley Laboratory (LBL) has fabricated and tested a downhole fluid sampler designed to operate under the pressures, temperatures, and chemical conditions that prevail in geopressured zones. Additionally, through the use of brine modeling codes, LBL has studied the chemical problems associated with production and disposal of geopressured fluids.

20163 (LBL—13600, pp 141-144) **Geophysical monitoring at the Cerro Prieto Geothermal Field.** Wilt, M.; Zelwer, R.; Majer, E.L. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

In 1978 we began a program of reservoir monitoring at the Cerro Prieto geothermal field using surface geophysical methods with the objective of observing changes resulting from production. The three methods used in this study are dipole-dipole resistivity, precision gravity, and passive seismic monitoring.

1504 Legal And Institutional Aspects

20164 (DOE/SF/01795—1) **Geothermal guidebook.** (National Conference of State Legislatures, Denver, CO (USA)). Jun 1981. Contract FG03-78SF01795. 55p. NTIS, PC A04/MF A01. Order Number DE83007211.

The guidebook contains an overview, a description of the geothermal resource, statutes and regulations, and legislative policy concerns. (MHR)

20165 (DOE/SF/01795—3) **National Conference of State Legislators Geothermal Project. Final report, February 1978-September 1982.** (National Conference of State Legislatures, Denver, CO (USA)). 1982. Contract FG03-78SF01795. 31p. NTIS, PC A03/MF A01. Order Number DE83007413.

The activities of the National Conference of State Legislatures Geothermal Project in stimulating and assessing state legislative action to encourage the efficient development of geothermal resources, including the use of ground water heat pumps, are reviewed by state. (MHR)

1506 Environmental Aspects And Waste Disposal

20166 (LBL—13600, pp 110-113) **Injection of cold water into geothermal reservoirs.** Bodvarsson, G.S.; Tsang, C.F.; Pruess, K.; O'Sullivan, M.J. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

Reinjection of geothermal wastewater is gradually becoming a preferred means of waste disposal. At present, continuous reinjection is practiced at The Geysers, California; Ahuachapan, El Salvador; Mak Ban, Philippines; and five Japanese geothermal fields. The increasing interest in reinjection undoubtedly results from growing environmental concerns regarding toxic minerals (e.g., boron, arsenic) present in geothermal wastewater. Our objective has been to investigate the advancement of the thermal front during injection into a fractured reservoir system. The system under consideration consists of equally spaced horizontal fractures intersecting an injection well. Analytical and numerical studies are designed to address the important question of how fractures affect the movement of the thermal front during injection.

1507 By-products

20167 (PB—82-260985) **Operation of a mineral recovery unit on brine from the Salton Sea Known Geothermal Resource Area. Report of investigations/1982.** Schultze, L.E.; Bauer, D.J. (Bureau of Mines, Reno, NV (USA). Reno Research Center). Jul 1982. 18p. NTIS, PC A02/MF A01.

The Bureau of Mines operated a mineral recovery unit to recover metal values from post-flash geothermal brines from the Salton Sea known geothermal resource area as part of its research into the use of plentiful resources. The brine was available for metals recovery after its heat content had been used to generate electricity. The brine source was treated with lime to precipitate the contained iron, manganese, lead, and zinc before injection of the heat-depleted brine into the underground reservoir. Data are presented on the effects of process variables, such as rate and method of lime addition and air oxidation versus air exclusion. Variations in precipitation of metal values, composition of precipitates, effectiveness of slurry thickeners, and methods of treating the precipitates to recover metal values are discussed.

1508 Geothermal Power Plants

REFER ALSO TO CITATION(S) 20012, 20192

20168 (LBL—13600, pp 108-110) **Baca demonstration project.** Bodvarsson, G.S.; Wilt, M.; Delany, J.; Tsang, C.F. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

The Baca geothermal field is located in the Valles Caldera, New Mexico, approximately 55 miles north of Albuquerque. The field is being developed for 50 MWe power production by the Union Oil Company of California (Union) and the Public Service Company of New Mexico (PNM) in cooperation with the Department of Energy (DOE). To date, 24 wells have been drilled in the Redondo Creek area in the western part of the caldera. The role of Lawrence Berkeley Laboratory in the Baca project is to analyze the data made public by Union and to act as an advisor to DOE during the course of the project. This report summarizes this year's activities and describes the present status of the Baca project.

20169 (LBL—13600, pp 168-170) **Partitioning of hydrogen sulfide in the condensers of Geysers Unit 15.** Weres, O. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1981.

Geysers Unit 15 was the first of the geothermal units equipped with surface condensers to go on line at The Geysers power plant of the Pacific Gas and Electric Company. Units 1 through 12 have contact condensers. The switch to surface condensers was motivated by considerations of hydrogen sulfide emission abatement. In the contact condensers, there is a large liquid-to-vapor ratio, and about 75% of the hydrogen sulfide that is present in the geothermal steam supply ends up dissolved in the cooling water. Once in the cooling water, it is emitted to the atmosphere from the cooling towers unless further, tertiary abatement is employed. It was reasoned that, because the liquid-to-vapor ratio in a surface condenser would be smaller by a factor of about twenty-five than in a contact condenser, most of the hydrogen sulfide would remain in the vapor phase and leave with the gas vented from the condenser rather than by dissolving in the condensate. Unit 15 is equipped with a Stretford Unit, which removes the hydrogen sulfide from the vent gas and converts it to elemental sulfur by reaction with air. Therefore, the fraction of the hydrogen sulfide that leaves the condenser with the vent gas is not emitted to the atmosphere.

1509 Geothermal Engineering

REFER ALSO TO CITATION(S) 22056

20170 (ANL/NESC—891) **ANALYZE; hydrothermal reservoir test analysis.** Benson, S.M.; McEdwards, D. (Lawrence Berkeley Lab., CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048891.

Maxima of - 20 observation wells 99 observation points per well 250 flow rate points per production well; .

ANALYZE is a history matching program designed for the analysis of both interference tests and production tests in single phase, fluid saturated reservoirs. The analytic solution calculates pressure responses in an isothermal, isotropic, homogeneous, porous medium of constant thickness and infinite areal extent. The production well is modeled as a fully penetrating line source. Flow in the reservoir is horizontal and of uniform flux over the height of the well. Linear boundaries are modeled using the method of images. By minimizing the difference between a set of measured pressure points and a set of calculated pressure points the program returns the reservoir parameters of transmissivity, storativity, and distance to a single linear reservoir boundary. In addition, for analysis of production well data, a "skin" value indicative of the wellbore condition can be obtained. The technique employed allows the simultaneous analysis of pressure data from up to twenty observation wells, each influenced by the production and/or injection of as many as 20 wells with arbitrarily varying flow rates.CDC7600; FORTRAN IV (99%) and COMPASS (1%); SCOPE 2.1.5; 27,000 (octal) words of SCM and 107,000 (octal) words of LCM storage.

20171 (ANL/NESC—892) **CCC; one-phase conduction convection compaction.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Bodvarsson, G.S. (Lawrence Berkeley Lab., CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048892.

Maximum of - 12 materials It is assumed that - (a) Darcy's law adequately describes fluid movement through fractured and porous media. (b) The rock and fluid are in thermal equilibrium at any given time. (c) Energy changes due to the fluid compressibility, acceleration, and viscous dissipation are neglected. (d) One-dimensional consolidation theory adequately describes the vertical deformation of the medium. .

The numerical model CCC (conduction-convection-consolidation) solves the heat and mass flow equations for a fully, liquid-saturated, anisotropic porous medium and computes one-dimensional (vertical) consolidation of the simulated systems. The model has been applied to problems in the fields of geothermal reservoir engineering, aquifer thermal energy storage, well testing, radioactive waste isolation, and in situ coal combustion. The code has been validated against analytic solutions for fluid and heat flow, and against a field experiment for underground storage of hot water.CDC7600; FORTRAN IV; SCOPE 2.1.5; 66,000 (octal) words of memory.

20172 (ANL/NESC—893) **SHAFT79; two-phase geothermal reservoir model.** Pruess, K.; Schroeder, R.C. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048893.

SHAFT79 has been developed only for systems of water and rock. The fluid table covers most of the equation of state of water substance in the temperature range of 5 to 400 degrees C and the pressure range of 0.5 to 220 bars, which is adequate for most geothermal applications.

SHAFT79 (Simultaneous Heat And Fluid Transport) is an integrated finite difference program for computing two-phase non-isothermal flow in porous media. Although designed for simulating production and injection in geothermal reservoirs, it is, or can be readily modified to be, applicable to other two-phase problems. SHAFT79 solves coupled mass and energy balance equations based on the following major assumptions: the physical system is a system of porous rock saturated with a one-component fluid in liquid and vapor form; all rock properties, except porosity, i.e., density, specific heat, thermal conductivity, and absolute permeability are independent of temperature, pressure, or vapor saturation; and liquid, vapor, and rock matrix are at the same temperature and pressure at all times. Capillary pressure is neglected.CDC7600; FORTRAN IV; SCOPE 2.1; 725,000 (octal) words of storage are required.

20173 (ANL/NESC—894) **TERZAGI; isothermal fluid flow & subsidence.** Narasimhan, T.N. (Lawrence Berkeley Lab., CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048894.

TERZAGI solves for transient and steady-state fluid potentials in one-, two- or three-dimensional saturated, deformable systems, such as artesian aquifers or petroleum reservoirs. The system can be made up of porous or fractured materials and can have complex geometry. The flow region can be heterogeneous and anisotropy can be handled by orienting surfaces of volume elements normal to principal axes of permeability. The material properties such as permeability and matrix compressibility can be functions of pressure. Boundary conditions can be functions of potential or time. The program has been applied to problems related to ground subsidence, flow in fractured rocks, and hydraulic fracturing and has been extensively validated.CDC7600,CYBER175; FORTRAN IV; SCOPE 2.1.5 (CDC7600), NOS 1.3 (CYBER175); 106,000 (octal) words of main memory are required for execution.

20174 (ANL/NESC—895) **WELBORE; transient wellbore fluid flow model.** Miller, C.W. (Lawrence Berkeley Lab., CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048895.

WELBORE is a code to solve transient, one-dimensional two-phase or single-phase non-isothermal fluid flow in a wellbore. The primary thermodynamic variables used in solving the equations are the pressure and specific energy. An equation of state subroutine provides the density, quality, and temperature. The heat loss out of the wellbore is calculated by solving a radial diffusion equation for the temperature changes outside the bore. The calculation is done at each node point in the wellbore.CDC7600,CYBER175; FORTRAN IV; SCOPE 2.1.5; 55,000 (octal) words of SCM storage.

20175 (DOE/SF/11503—T2) **Simulated heat-exchanger tubes: DOE Geothermal Test Facility, East Mesa, California. Corrosion test report.** Ellis, P.F. II; Anliker, D.M. (Radian Corp., Austin, TX (USA)). Nov 1982. Contract AC03-81SF11503. 19p. (DCN—82-212-011-42). NTIS, PC A02/MF A01. Order Number DE83007415.

A 1032-hr corrosion test was made of two geothermal heat exchanger materials, Allegheny-Ludlum Alloy 29-4 and Alloy 29-4C. Coupons of the two metals were exposed under conditions simulating flow in a geothermal heat exchanger tube. Continuous flow and cyclic exposure tests were made. No signs of localized corrosion were observed in either the base metal, tube weld seam, or heat affected zone. Most coupons showed statistically insignificant weight change. A corrosion rate of less than 0.5 mil/yr is indicated. No significant difference in the performance of the two alloys is reported. (LEW)

20176 (LBL—13600, pp 115-118) **Generic studies of geothermal reservoir behavior.** Pruess, K.; Bodvarsson, G.S.; Lippmann, M.J.; Truesdell, A.H. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

The characteristics and behavior of geothermal reservoirs are often strongly influenced by geologic and hydrologic conditions that are peculiar to a given site. Site-specific detail can render a reservoir description and analysis so complex that it becomes difficult to identify the important physical mechanisms and parameters which govern reservoir behavior. Some important insight into the evolution of geothermal reservoirs under natural or man-made conditions can be gained from a study of schematic, idealized representations of such reservoirs. Generic studies are particularly useful for two-phase geothermal reservoirs with coexisting water and steam. The presence of two phases with different densities and heat contents can give rise to peculiar and sometimes surprising phenomena, which can be conveniently explored by means of computer simulation. In this paper, two such simulation studies are summarized. One addresses the problem of natural evolution of geothermal reservoirs over geologic time; the other examines energy recovery and reservoir longevity for different completion depths of production wells.

20177 (LBL—13600, pp 124-125) **Simulation of thermal energy storage in a doublet well system.** Buscheck, T.A.; Doughty, C.; Tsang, C.F. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

While the first cycle of the 1981 series of experiments was being carried out by Auburn University at Mobile, Alabama, Lawrence Berkeley Laboratory (LBL) was performing a numerical simulation based on the field operating conditions to predict the outcome of the experiment before its conclusion. The goal was to test our understanding of the aquifer storage problem and to validate our numerical model CCC. In the Mobile experiment, 25,000 m^3 of water at approximately 55 to 60°C was injected over a period of one month into an aquifer that is approximately 21 m thick, has a permeability of about 63 d and was initially at 20°C. It was then stored for one month and subsequently produced.

20178 (LBL—13600, pp 126-128) **Dimensionless parameter approach to the thermal behavior of an aquifer thermal energy storage system.** Doughty, C.; Hellstrom, G.; Tsang, C.F.; Claesson, J. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

The purpose of aquifer thermal energy storage (ATES) site-characterization studies is to develop a general procedure whereby the energy recovery factor for a given site may be predicted readily for a wide range of operating conditions without doing detailed numerical simulations. The study summarized here considers the thermal behavior of an ATES system with steady radial fluid flow around a single injection/production well. Buoyancy flow is neglected, and the aquifer is confined above and below by impermeable confining layers.

20179 (LBL—13600, pp 128-129) **Characterization of heat storage in confined aquifers with buoyancy flow.** Buscheck, T.A.; Tsang, C.F. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

In order to develop a graphical means of estimating the energy recovery performance of a proposed storage aquifer, including buoyancy effects, numerical simulations have been conducted over a wide range of aquifer permeabilities and injection temperatures using the numerical model CCC, which takes into account temperature-dependent parameters and the buoyancy flow process.

20180 (LBL—13600, pp 129-132) **Comparative study of four major approaches to predicting ATES performance.** Doughty, C.; Buscheck, T.A.; Bodvarsson, G.S.; Tsang, C.F. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

The International Energy Agency test problem involving Aquifer Thermal Energy Storage (ATES) has been solved using four approaches: the numerical model PF (formerly CCC), the simpler numerical model SFM, and two graphical characterization schemes. Each of the four techniques has its advantages and disadvantages, as discussed in the paper.

20181 (LBL—13600, pp 144-147) **Reservoir engineering studies of the Cerro Prieto Geothermal Field.** Goyal, K.P.; Lippmann, M.J.; Tsang, C.F. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

Reservoir engineering studies of the Cerro Prieto geothermal field began in 1978 under a five-year cooperative agreement between the US Department of Energy and the Comision Federal de Electricidad de Mexico (CFE), with the ultimate objective of simulating the reservoir to forecast its production capacity, energy longevity, and recharge capability under various production and injection scenarios. During the fiscal year 1981, attempts were made to collect information on the evolution history of the field since exploitation began; the information is to be used later to validate the reservoir model. To this end, wellhead production data were analyzed for heat and mass flow and also for changes in reservoir pressures, temperatures, and saturations for the period from March 1973 to November 1980.

20182 (SAND—81-1795C) **USA program in geothermal drilling and completion research and development.** Carson, C.C.; Caskey, B.C. (Sandia National Labs., Albuquerque, NM (USA)). 1982. Contract AC04-76DP00789. 21p. (CONF-820506—3). NTIS, PC A02. Order Number DE82006298.

From International conference on geothermal energy; Florence, Italy (11 May 1982).

The program objective is to conduct long-range R and D aimed at developing advanced geothermal drilling and completion systems to expand resource utilization. The program is organized into four broad categories: (1) rock penetration mechanics, (2) drilling fluids, (3) borehole mechanics, and (4) diagnostics technology. Although much effort has been concentrated on bit development under rock penetration mechanics, current work focuses on understanding the limitations of drag bits as they apply to hard rock drilling systems. Fluid technology R and D addresses the high temperature, high corrosion and abnormal pressure problems found in geothermal areas. A high-temperature clay-based mud has been developed. The R and D in borehole mechanics addresses the problems of lost circulation and lining and cementing the well, as well as problems of production maintenance such as perforating and scale removal. Well logging and downhole instrumentation R and D activities are organized under the diagnostics technology program element.

20183 (SAND—82-1616) **Effects of oxygen, salt, and pH level on corrosion rate of drill-stem steel.** Weirick, L.J. (Sandia National Labs., Albuquerque, NM (USA)). Nov 1982. Contract AC04-76DP00789. 44p. NTIS, PC A03/MF A01. Order Number DE83007580.

A technique proposed to control corrosion of the drill pipe is removal of oxygen from the drilling fluid. One approach to oxygen reduction is to substitute an anaerobic gas for air in the drilling fluid. A critical question to be answered when designing the anaerobic gas generator is what level of oxygen concentration is acceptable within the inert gas such that a low corrosion rate will be maintained. A laboratory program was done to answer this question. The program was designed to determine the effect of oxygen content, salt concentration and pH level on the corrosion rate of plain carbon steel. The corrosion rate of steel was found to decrease with increasing salt concentration at fixed pH levels and with oxygen contents in solution at equilibrium with air at 90°C. The corrosion rate was found to decrease with increasing pH at fixed concentrations of salt and oxygen at 90°C. The corrosion rate was also found to be proportional to the dissolved oxygen concentration at fixed pH levels and salt concentration. It is recommended that the anaerobic gas generator be designed to lower the oxygen concentration one order of magnitude below that in solution in equilibrium with air, that is, to approximately 500 ppB at 90°C.

20184 (SAND—83-0422C) **Geothermal versus conventional drilling.** Kelsey, J.R. (Sandia National Labs., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 3p. (CONF-830422—1). NTIS, PC A02/MF A01. Order Number DE83007603.

From Workshop on high temperature geothermal wells: planning, drilling and completion; Reno, NV, USA (5 Apr 1983).

The procedure for drilling, completing, and logging a geothermal well is outlined. The areas which differ from conventional oil and gas methods are pointed out. (MHR)

20185 **Temperature profiles and aquifer mass transfer in a circulating well.** Oster, C.A.; Scheffler, W.A. (Battelle Pacific Northwest Laboratory, P. O. Box 999, Richland, Washington 99352). *Journal of Heat Transfer;* **104**: No. 1, 173-180(Feb 1982). Contract AC06-76RL01830.

A method is described for determining the temperature distribution in a circulating drilling fluid when aquifers are present in the formation. The depth of an aquifer relative to the well depth is shown to be an important parameter. An aquifer near the surface has much less influence on the temperature distributions than one located near the bottom of the well. If the drilling fluid has much greater density than the entering formation water, then the temperature distributions are altered significantly.

1510 Direct Energy Utilization

20186 (EUR—7801-EN) **Geothermal heating.** Aureille, M. (Commission of the European Communities, Brussels (Belgium)). 1982. 117p. European Community Information Service, 2100 M Street NW, Suite 707, Washington, DC 20037.

The decision to build a gothermal heating plant generally requires the prior knowledge of a number of factors, some of which cannot be determined at the time the decision is made. It is useful to estimate the degree to which a geothermal project can be influenced by the totality of these variables. This problem has necessitated the use of computer programs. The aim of this study is to demonstrate the influence of the main variables and then to supply nomograms from which an initial estimate may be made, without having to use data-processing faiclities, of the viability of projects in both energy and economic terms. The studies carried out by EDF and OET were divided up as follows: EDF concentrated on the effect of the variables on drilling (flow rate and temperature of the geothermal water) and on the network whereas OET concentrated on the effect of climate and the type of housing. As regards the central boiler plant, similar studies have been carried out showing two alternative schemes for the incorporation of heat pumps. The graphs and nomograms have been drawn up by EDF, using the same criteria to describe the housing accomodation and the plan for connecting the heating network to the geothermal resource.

20187 (NP—3901249) **Appendices of an appraisal for the use of geothermal energy in state-owned buildings in Colorado. Section A. Alamosa.** Meyer, R.T.; Coe, B.A.; Dick, J.D. (Colorado Geological Survey, Denver (USA)). 1981. 41p. Colorado Geology Survey, Dept. of Natural Resources, Denver, CO.

Two state-owned building complexes have been evaluated within the city of Alamosa: Adams State College and the State Highway Department Buildings. The resource assessment in dicates that 150°F may be available at flow rates of 1000 gpm per well, depths of 4000 feet, and possibly under Artesian pressure. Two building retrofit engineering options are evaluated for Adams State College, both of which assume only partial replacement (approximately 50%) of the existing natural-gas-fired steam-boiler system. The two retrofit options for goethermal heating include (1) a high performance central heat pump for boosting the circulating heat water to 200°F for space heating and (2) a central heat exchanger for delivery of heating water at 145°F. The first option provides for continued usage of the existing hot water heating units in the campus buildings, with the exception of retrofit of the steam units in College Center. The second option provides for the addition of terminal hot water heating units in all of the buildings in order to adapt to 145°F heating water. Retrofit engineering for the State Highway Department Buildings provides for the use of a central heat exchanger and the distribution of 140°F heating water to all building areas that are presently heated.

20188 (NP—3901251) **Appendices of an appraisal for the use of geothermal energy in state-owned buildings in Colorado. Section E. Glenwood Springs.** Meyer, R.T.; Coe, B.A.; Dick, J.D. (Colorado Geological Survey, Denver (USA)). 1981. 23p. Colorado Geological Survey, Department of Natural Resources, Denver.

The State Highway Department Buildings in Glenwood Springs have been evaluated in this appraisal for the use of geothermal energy in state-owned buildings. Glenwood Springs is the location of surface hot springs and has been assessed by various parties for several geothermal applications. The Glenwood Highway Department Buildings consist of an office building and a maintenance garage. These two building140 gpm. currently use an array of natural gas forced air furnaces and electric heaters for space/heating purpose; a propane unit is used for one water heater. Retrofit engineering for geothermal heating is based upon a central plate-in-frame heat exchanger coupled to several fan coil heaters and unit heaters. Design heating can be accomplished with 150°F geothermal water at 140 gpm. The geothermal energy economics are evaluated for a single deep well, with and without a proration of the total production well cost for the required 140 gpm out of the 1000 gpm production capacity. Only the prorated well cost option provides an economically feasible geothermal system. The feasibility, therefore, depends on the use of the excess geothermal water by private or municipal facilities. The principal institutional/environmental issue for a geothermal heating sytem for the Highway Department Buildings is the question of whether or not the states owns the geothermal rights on the state property.

20189 (NP—3901252) **Appendices of an appraisal for the use of geothermal energy in state-owned buildings in Colorado. Section D. Durango.** Meyer, R.T.; Coe, B.A.; Dick, J.D. (Colorado Geological Survey, Denver (USA)). 1981. 63p. Colorado Geology Survey, Dept. of Natural Resources, Denver, CO.

Four state-owned building complexes ahve been evaluated within the city of Durango: The State Fish Hatchery, Fort Lewis College, new State Highway Department Building near the Bodo Industrial Park, and the National Guard Building. Three of the state facilities in Durango are evaluated for geothermal systems on thea ssumption of taking geothermal water from a trunk-line originating at the area northof Durango: State Fish Hatchery, Fort Lewis College and new State Highway Department Building. The National Guard Building is evaluated on the basis of a water-to-air heat pump, with warm water derived from a hypothetical shallow aquifer immediately below the building site. Two geothermal options were separately evaluated for Fort Lewis College: a central heat exchanger system for delivery of 145°F heating water to the campus buildings and a central heat pump system for boosting the heating water to 200°F prior to delivery to the buildings; both systems require the installation of a distribution piping network for the entire campus area. Retrofit engineering for the State Fish Hatchery provides for the installation of a small scale central distribution piping system to the several buildings, a central heat excanger coupled to the geothermal trunk line, and the use of various fan coil and unit heaters for space heating. An option is provided for discharge-mixing the geothermal water into the fish ponds and runs in order to raise the hatchery water temperature a couple degrees for increasing fish production and yield. The heating system for the new State Highway Department Building is redesigned to replace the natural-gas-fired forced-air furnaces with a heat exchanger, hot water fan coils and unit heaters.

20190 (NP—3901253) **Appendices of an appraisal for the use of geothermal energy in state-owned buildings in Colorado. Section C. Burlington.** Meyer, R.T.; Coe, B.A.; Dick, J.D. (Colorado Geological Survey, Denver (USA)). 1981. 13p. Colorado Geological Survey, Dept. of Natural Resources, Denver, CO.

The State Highway Department Building in Burlington has been evaluated in this geothermal energy appraisal. While there is no known geothermal resource at Burlington, a shallow water aquifer - Ogallala Aquifer - does exist beneath Burlington at depths of 200 to 300 feet. One particular water well is reported to be producing water at 59°F to 63°F at 800 to 1000 gpm. Therefore, the Ogallala is being considered as a source of warm water for the use of water-to-air heat pumps for space heating of the Highway Department Building. The geothermal energy economics are evaluated for two options: (1) a new water well drilled on the site of the Highway Department Building and (2) the purchase of warm water from an existing City of Burlington water well. The latter option is evaluated only for the 12 percent/9 percent (through 1984/through 2000) natural gas price escalation case, whereas the former option is evaluated for both the 15 percent and the 12 percent/9 percent schedules. The results of the economic evaluations generally indicate that heat pumps would not be economically competitive, particularly if the state purchased city water at the current water rates. Fuel price escalation rates greater than 15 percent per year can shift the heat pump shallow well option to a marginal position. The principal institutional/environmental issue to be addressed for the Burlington facility is an existing ordinance which only allows the city to drill water wells within the city.

20191 (NP—3901255) **Appraisal of the use of geothermal energy in state-owned buildings in Colorado.** Meyer, R.T.; Coe, B.A.; Dick, J.D. (Western Energy Planners Ltd., Denver, CO (USA)). 30 Jan 1981. 75p. Colorado Geological Survey, Dept. of Natural Resources, Denver.

An appraisal of the use of geothermal energy for space heating requirements for selected state-owned buildings in six communities in Colorado is presented. The appraisal addresses several components of a feasibility study for geothermal applications, including resource assessment, pipeline rights-of-way, well design and drilling program, conceptual engineering designs for retrofits of building heating systems, evaluations of economic feasibility, institutional requirements, and environmental considerations. Economic feasibility is determined from evaluation of four economic measures: a simple payback period in years; twenty-year annualized system costs (geothermal system versus conventional system); total twenty-year undiscounted energy savings; and total twenty-year present value energy savings. The results of the analyses of each feasibility component are finally ranked, using a weighting system, to arrive at an order ranking of the eleven state-owned buildings for overall feasibility. The relative total feasibility rankings and the absolute evaluations of economic competitiveness with the existing conventional-fuel heating systems show that several of the state facilities are likely candidates for conversion to geothermal hot water heating systems. The best candidate by far is the Colorado State Reformatory at Buena Vista. The geothermal resource at Buena Vista (Cottonwood Canyon and Chalk Creek) is a high quality resource with high water temperatures and a water quality adequate for direct flow through the building heating units.

20192 (NP—3901572) **Utilization of geothermal heat in tropical fruit-drying process.** Chen, B.H.; Lopez, L.P.; King, R.; Fujii, J.; Tanaka, M. (Hawaii Univ.--Hilo Coll. (USA); Hawaii Univ., Honolulu (USA); Okahara, Shigeoka and Associates, Inc., Hilo, HI (USA)). Oct 1982. 112p. NTIS, PC A06/MF A01. Order Number DE83901572.

The power plant utilizes only the steam portion of the HGP-A well production. There are approximately 50,000 pounds per hour of 360°F water produced (approximately 10 million Btu per hour) and the water is currently not used and is considered a waste. This tremendous resource could very well be used in applications such as food processing, food dehydration and other industrial processing that requires low-grade heat. One of the applications is examined, namely the drying of tropical fruits particularly the papaya. The papaya was chosen for the obvious reason that it is the biggest crop of all fruits produced on the Big Island. A conceptual design of a pilot plant facility capable of processing 1000 pounds of raw papaya per day is included. This facility is designed to provide a geothermally heated dryer to dehydrate papayas or other tropical fruits available on an experimental basis to obtain data such as drying time, optimum drying temperature, etc.

20193 (PNL-SA—8907) **Economics of solar, geothermal, and conventional space heating.** Garrett-Price, B.A. (Pacific Northwest Lab., Richland, WA (USA)). Oct 1980. Contract AC06-76RL01830. 9p. (CONF-801210—30). NTIS, PC A02/MF A01. Order Number DE83003464.

From 3. Miami international conference on alternative energy sources; Miami Beach, FL, USA (15 Dec 1980).

The costs of residential heating using conventional, solar and geothermal energy were calculated for a number of locations throughout the United States using life-cycle costing methodology. Using these costs, regions and applications are identified which show the most promise for near-term commercialization of geothermal and solar energy. Equally important, areas and applications are depicted which are not likely to be promising for solar or geothermal heating in the near-term. The regions showing the most immediate promise for solar heating occur in central Nevada, Utah and Colorado. These regions are characterized by high levels of insolation and high annual heating degree-days. Geothermal urban district heating currently appears to be an economic option for providing space heat in at least six locations: Reno, Nevada; Idaho Falls, Boise and Twin Falls, Idaho; Helena, Montana; and Klamath Falls, Oregon. These areas are characterized by high annual heating degree-days, high resource temperatures, and short transmission distances. In the near-term, conventional heating will continue to be most economic: (1) in the South (where annual heat demand is low); (2) in the Northeast and Midwest (where isolation levels are low and where known geothermal resources are not yet available); and (3) in the Pacific Northwest coastal region (where low-cost electricity is available).

1520 Geothermal Data And Theory

REFER ALSO TO CITATION(S) 20147, 22062

20194 (CONF-8209108—1) **Some natural zeolites: recent thermodynamic results, their application, and the estimation of missing thermodynamic quantities.** O'Hare, P.A.G.; Johnson, G.K.; Flotow, H.E.; Wise, W.S. (Argonne National Lab., IL (USA); California Univ., Santa Barbara (USA)). 1982. Contract W-31-109-ENG-38. 6p. NTIS, PC A02/MF A01. Order Number DE83007704.

From 2. conference on calorimetry; Prague, Czechoslovakia (13 Sep 1982).

New calorimetric measurements are reported on the following minerals: analcime, dehydrated analcime, natrolite, scolecite, mesolite, and heulandite. The thermodynamic quantities determined include the standard enthalpy of formation, ΔH/sub f/° (298°K), the high- and low-temperature enthalpy increments, H° (T) - H° (298°K), the low-temperature (5 to 350°K) heat capacity, C/sub p/° (T), the standard entropy, S° (T), and the Gibbs energy of formation, ΔG/sub f/° (T). The application of calorimetric data to equilibria of geologic interest is demonstrated. A part of the paper also deals with the estimation of missing thermodynamic quantities.

20195 (LBL—13600, pp 151-152) **Behavior of rock-fluid systems at elevated temperatures and pressures.** Somerton, W.H. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

With an increase in the number of underground processes being studied in environments that are either artificially heated or that are naturally subject to high temperatures and pressures, knowledge of the physical properties and behavior of rock-fluid systems under stress and at elevated temperatures has become important in designing, controlling, and analyzing such processes. The purpose of the present research project is to provide data on the following properties of rock-fluid systems: deformation properties, including pore and bulk compressibilities and thermal expansions; P- and S-wave velocities; absolute permeability; electrical resistivity factor; and thermal properties, including conductivity, diffusivity, and specific heats. Work accomplished during the past year in two areas (modeling of pore and bulk compressibilities and thermal expansions, and measurements of electrical resistivity factors at elevated temperatures) is reviewed here.

20196 (LBL—13600, pp 152-154) **Thermodynamics of high-temperature brines.** Pitzer, K.S.; Rogers, P.S.Z.; Peiper, J.C. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

Current interest in a variety of geochemical phenomena, including geothermal and geopressurized brines, has focused attention on the importance of a model for aqueous solution properties at high temperatures and pressures. The number of different brines encountered is large, hence obtaining detailed measurements on each of them is impractical. A model was needed that would be capable of predicting the properties of complex brines yet be based on a minimum amount of experimental data on a few key systems. Thus a program was begun in 1975 to study the solution thermodynamics of brine systems, including both modeling and experimental work.

20197 (LBL—13600, pp 155-157) **Preliminary determination of the $Al(OH)_4^-$ stability constants in the aqueous phase at elevated temperatures.** Neil, J.M.; Apps, J.A. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

One of the benefits to be gained from measuring the solubilities of major rock-forming minerals in the aqueous phase at elevated temperatures is the opportunity of testing thermochemical models describing aqueous interactions. The refinement of such models is an important step in interpreting geochemical reactions taking place during diagenesis, metasomatism, and metamorphism. Comparison between measured solubilities and the solubilities projected from calorimetric data serves to identify either data base or model errors, which become the departure point for further research. One source of error is the uncertainty about the species of aluminum in solution at elevated temperatures.

20198 (LBL—13600, pp 157-159) **Thermodynamic properties of silicate materials.** Carmichael, I.S.E.; Moret, L.K.; Rivers, M.L.; Stebbins, J.F.; Mo, X. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

Measurements of the thermodynamic properties of silicate liquids and glasses are generally few in number, and yet essential if the generation of magmas at depth in the earth, their ascent toward the surface, and their ascent toward the surface, and their cooling on or near the surface are to be quantified. General geologic investigations have provided almost unlimited data on the range of compositions of natural silicate liquids, but comparatively little on the correspondence between their composition and such properties as volume, thermal expansion, compressibility, heat content, and heat capacity. It is the intent of this experimental program to remedy this situation by combining measurements of thermodynamic properties over a wide range of silicate compositions to obtain the compositional dependence of the measured property.

20199 (LBL—13600, pp 160-163) **Nonequilibrium, interphase mass transfer in chemical transport by groundwater.** Carnahan, C.L.; Remer, J.S. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

The research described here is a part of a larger study of nonequilibrium processes in mass transport by flowing groundwater. In this phase of the work, we have developed analytical solutions for convective-dispersive transport of a radioactive solute that undergoes time-dependent sorption on surfaces of the matrix supporting the flow. The rate of sorption is represented by a linear kinetic rate law, corresponding to the approximation of very low sorbate activity in the fluid phase. These solutions were derived, along with solutions for the case of equilibrium sorption, to serve as references for comparison with numerical results for transport problems using nonlinear kinetic rate laws of sorption and with more complex treatments, including effects of thermodynamic coupling of transport processes; these investigations are now in progress.

20200 **(PB—83-111443) The solubility of methane, carbon dioxide, and oxygen in brines from 0 deg to 300 deg c. Report of investigations/1982.** Cramer, S.D. (Bureau of Mines, Avondale, MD (USA). Avondale Research Center). Aug 1982. 23p. NTIS, PC A02/MF A01.

The solubility of methane, carbon dioxide, and oxygen was measured in brines at temperatures from 0 to 300C as part of Federal Bureau of Mines research on the corrosion of metals in high-temperature geothermal and mineral processing environments. Solubilities were measured by the technique of extracting pure gas, dissolved at pressures where Henry's law was applicable, from known volumes of brine. The results were smoothed with respect to temperature.

20201 **Heat and mass transfer in a fault-controlled geothermal reservoir charged at constant pressure.** Goyal, K.P.; Narasimhan, T.N. (Earth Sciences Division, Lawrence Berkeley Laboratory, University of California, Berkeley, California 94720). *Journal of Geophysical Research;* **87**: No. B10, 8581-8590(10 Oct 1982).

A two-dimensional mathematical model of a fault-controlled geothermal reservoir has been developed. Heated lighter water, rising in the fault, is assumed to charge a reservoir which, in turn, is overlain by a thin, impermeable, thermally conducting cap rock. The mass flow rate or the pressure associated with the charging process at the fault inlet is unknown and can only be estimated. Thus in this paper the pressure in the fault at the bottom of the reservoir is assumed to be presented. Quasianalytic solutions for the velocity, pressure, and temperature are obtained in the fault-reservoir system for a high Rayleigh number flow. In this approximation, the upwelling fluid does not cool off appreciably until it reaches the cold upper boundary of the reservoir and encounters conductive heat loss. This thermal boundary layer, which is thin at the top of the fault, grows outward laterally and occupies the full thickness of the aquifer far away from the faults. The mathematical model is based on the flow of liquid water in a saturated porous medium. The solution techniques involve the combination of perturbation methods, boundary layer theory, and numerical methods. The analysis of this generic model can be applied to liquid-dominated geothermal systems where the thickness of the impermeable cap rock is very small compared to the depth of the reservoir.

17 WIND ENERGY

20202 **(N—8228783) Capturing energy from the wind.** Schefter, J.L. (National Aeronautics and Space Administration, Washington, DC (USA)). 1982. 88p. (NASA-SP—455). NTIS (US Sales Only); GPO HC $6.00 as 033-000-008-50-3.

The history of windpower is reviewed. Wind turbine technology is discussed. Examples of small and large turbines are provided. Electric power generation is considered. Numerous illustrations are included.

1701 Availability (climatology)

20203 (Juel-Spez—71, pp 195-205) **Testing and evaluating of LS/WECS.** Schroers, H. Mar 1980. Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe, Germany, F.R.

From 3. meeting of experts - data acquisition and analysis for large scale wind energy conversion systems; Blowing Rock, NC, USA (26 - 27 Sep 1979).

Designing and putting up a windmill somewhere in order to gain energy by wind, the following questions will arise: 1. location, 2. wind profile, 3. extreme wind velocities, 4. gust factors and profiles, 5. power spectra of wind, 6. horizontal and vertical correlations. The first two items are very important to economic use. The next items are of considerable importance to safety against fracture. Instrumentation of wind measurements is discussed and a plant for determing gusts is presented.

20204 **(NYSERDA—81-22) Wind-energy resources in the area of the City of Buffalo.** Sforza, P.M.; Smorto, M.J. (Flowpower, Inc., Huntington Station, NY (USA)). Sep 1981. 107p. New York State Energy Research and Development Authority, Two Rockefeller Plaza, Albany, NY 12223.

An evaluation of wind energy resources found in the area of the City of Buffalo is presented. Wind speed and direction data from three sites within the City have been collected and subjected to computer processing for identification of candidate sites for wind energy conversion applications. A detailed assessment of wind turbine performance at the three sites is carried out and the resulting data are presented. An economic analysis of the value of operating nine different large-scale (65 kW to 6200 kW) wind turbine generators at these sites is then performed and the capital and operating costs are listed and discussed, for the case of individual demonstration units. A description of various financial considerations, such as simple payback period for each machine at the three sites is also presented. The institutional, environmental and land use considerations operative at the three selected sites are discussed. The outlook for improvements in the delivery and economics of wind power through technological development is described.

1703 Regulations

REFER ALSO TO CITATION(S) 20210, 20214

20205 **(RFP—3386) Small-wind-systems zoning issues and approaches.** Dodge, D.M.; Lawless-Butterfield, C. (Rockwell International Corp., Golden, CO (USA). Energy Systems Group). May 1982. Contract AC04-76DP03533. 64p. NTIS, PC A04/MF A01. Order Number DE83007195.

Issues associated with installing small wind systems in areas covered by local zoning codes and ordinances are discussed. The discussion is designed for three audiences: zoning boards, purchasers of small wind systems, and manufacturers and dealers whose products must comply with the codes and who are often called upon for assistance and information by their customers. Beginning with a brief description of small wind systems, the report goes on to explain the requirements for siting them, including the reasons high towers are needed. Commonly defined tower safety and wind-turbine safety and environmental issues are discussed and distinctions made between those which should not be of concern and those which should be addressed by zoning boards. The nature of zoning regulations, including the legal bases for local jurisdiction, are discussed for the benefit of those with little or no experience in this complex subject. To further aid small-wind-systems purchasers and manufacturers/dealers, a step-by-step procedure is provided for developing and presenting a variance or compliance application. Finally, an annotated series of approaches to small-wind-systems zoning issues gleaned from ordinances which have been proposed or enacted in various localities throughout the United States is appended.

1704 Economics

REFER ALSO TO CITATION(S) 20214

20206 **(ANL/NESC—932) WECS; wind energy value to electric utilities.** Hock, S. (Solar Energy Research Inst., Golden, CO (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048932.

WECS is a package of five computer models developed by the Solar Energy Research Institute to implement a method for determining the value of Wind Energy Conversion Systems (WECS) to electric utilities. These models, WTP, WEIBUL, ROSEW, ULMOD, and FINAM, may be used with most utility planning models. The value determination procedure begins with the processing of weather data by either the WTP or WEIBUL program to produce hourly wind speed data or wind probability distributions for each hour of a monthly typical day, respectively. The function of WTP is to convert a single year of standard weather data into a format acceptable to the ROSEW program. WEIBUL is preferable to WTP if two or more years of weather data are available because its probabilistic representation of hourly wind speeds is more likely to represent the long-term wind speeds than WTP's hourly average wind speeds. ROSEW calculates the wind energy system hourly power output using weather data supplied and wind machine characteristics. For WTP-supplied weather data, a single hourly wind power is calculated. For WEIBUL-supplied weather data, a group of wind powers with associated probabilities for each hour is calculated. ULMOD uses the electricity production estimate calculated by ROSEW to reduce a user-supplied utility hourly-load forecast. This reduced load profile is then put into a variety of forms suitable for use with electric utility planning models (e.g. LOLP, PRODUCTION COSTING, GENERATION EXPANSION PLANNING). Utility load forecasting uncertainty can be reflected. FINAM is designed to determine the value (in $/kW) and marginal value of alternative electric utility investment options, such as Wind Energy Conservation Systems, by using base case utility operating data with up to ten change cases.

20207 **(N—8229712) Wind turbine value analysis for electric utilities.** Dub, W. (Regensburg Univ. (Germany, F.R.)). Jun 1982. 20p. NTIS, PC A02/MF A01.

A methodology for the analysis of the value of large-scale wind turbines to electric utilities, and its application to utility, socioeconomic and meteorological data in two case studies is described. The value analysis was carried out for the year of reference 1985 and included different levels of wind turbine penetration. Results of the value analysis are given. The utility planning procedures in current use and the unique problems of the integration of wind power into the power system are discussed. Observations and conclusions regarding the current and future potential of wind power for utilities are presented.

20208 **(NYSERDA—81-22(A)) Wind farm economics in the area of the city of Buffalo.** Liebowitz, B. (New York State Energy Research and Development Authority, New York (USA)). Dec 1982. 18p. New York State Energy Research and Development Authority, Two Rockefeller Plaza, Albany, NY 12223.

The economics of wind energy in the area of the city of Buffalo is reviewed from the point of view of the private wind farm developer. The tax provisions of the Windfall Profits Tax and the Economic Recovery Tax Act are applied to a discounted cash flow analysis.

20209 **(RFP—3448) Wind systems life cycle cost analysis: a description and users manual.** Sherman, J.M.; Gresham, M.S.; Fergason, D.L. (Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant). Jul 1982. Contract AC04-76DP03533. 88p. NTIS, PC A05/MF A01. Order Number DE83008769.

This report describes the LIFECC computer program developed for the purpose of calculating the cost of energy produced by wind systems according to the principles of life cycle costing (LCC). Following a brief explanation of the LCC concept and its advantages, input variables to the program and their importance to various program users, including manufacturers and designers, utilities, various institutions and consumers, are explained. A detailed user's guide to the program is then provided, together with a sensitivity analysis which discusses the impact of key variables on wind system cost of energy and the importance of cash flow to the wind system purchaser. Sample cases of program output and an LIFECC program listing are provided.

1705 Environmental Aspects

REFER ALSO TO CITATION(S) 20214

1706 Wind Energy Engineering

REFER ALSO TO CITATION(S) 19966, 20012

20210 **(BEOP—16) Building licenses for wind turbines. Preliminary directives and case studies.** (Bureau Energie Onderzoek Projecten, Patten (Netherlands)). Dec 1982. 86p. (In Dutch). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83901339.

Directives for construction permits and operating licenses. Possible effects on the environment (nuissance, bird killing, noise and vibration, poor reception of radio and TV signals) are discussed briefly. Guidelines related to safety, construction and urban planning are dealt with and conditions for the erection of wind turbines are given. Legal aspects are surveyed.

20211 **(DOE/NASA/0129—1) Design and evaluation of low-cost stainless steel - fiberglass-foam blades for large wind-driven generating systems.** Eggert, W.S. Jr. (Budd Co., Fort Washington, PA (USA). Technical Center). Oct 1982. Contract AI01-76ET20320. 56p. (NASA-CR—165491). NTIS, PC A04/MF A01. Order Number DE83007588.

The development of a low cost wind turbine blade design based on a stainless steel/fiberglass foam design concept is described, and its principle characteristics, its low cost features, and its advantages and disadvantages are evaluated. A blade structure was designed and construction methods and materials were selected. Complete blade tooling concepts, various technical and economic analysis, and evaluations of the blade design were performed. A study was made to determine the applicability of the blade design concept to various blade lengths in the range of 15 ft to 200 ft. A test specimen of the spar assembly, including the root and attachment, was fabricted. This 20 ft long full-scale section will be fatigue tested by NASA. It was concluded that the stainless steel/fiberglass-foam blade concept is a viable design for application to large wind turbine systems. A blade design was completed which meets the requirements for operation on the MOD-OA wind turbine. The design concept is applicable to various length blades. Blades less than 60 feet would use a stainless steel spar and blades of larger size would have a fusion welded carbon steel spar. The design permits a choice of a wide selectivity of air-foil shapes and, because of its modular construction, the design provides producibility and quality in high volume production.

20212 (DOE/NASA/20320—43) **Construction of low-cost, Mod-0A wood-composite wind-turbine blades.** Lark, R.F. (National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center). 1983. Contract AI01-76ET20320. 15p. (NASA-TM—83046; CONF-830408—3). NTIS, PC A02/MF A01. Order Number DE83005344.

From 28. national Society for the Advancement of Materials Process Engineers symposium; Anaheim, CA, USA (12 Apr 1983).

The construction of two sixty-foot, low-cost, wood composite blades for service on 200 kW Mod-0A wind turbines is described. The blades were constructed of epoxy resin-bonded Douglas fir veneers for the leading edge sections, and paper honeycomb-cored, birch plywood faced panels for the afterbody sections. The blades were joined to the wind turbine hub by epoxy resin-bonded steel load take-off studs embedded into the root end of the blades. The blades were installed on the 200 kW Mod-0A wind turbine facility at Kahuku, Hawaii. The blades have completed nearly 8000 hours of operation over an 18 month period at an average power of 150 kW prior to replacement with another set of wood composite blades. The blades were replaced because of a corrosion failure of the steel shank on one stud. Inspections at NASA-Lewis showed that the wood composite structure remains in excellent condition.

20213 (DOE/R5/10109—1) **Demonstration of an a-c utility-connected wind generator in an urban setting. Final report, June 1979-December 1982.** Hill, L.; Kistler, A. (Evanston, City of, IL (USA)). 31 Jan 1983. Contract FG02-79R510109. 99p. NTIS (US Sales Only). Order Number DE83006696.

The goal of the work reported was the visible demonstration of an archetypical small wind machine specifically designed for urban conditions. A concurrent education program about wind machines and their urban potential was to be given for manufacturers, marketers, and consumers. The intent of the project, changes and developments are chronicled, followed by technical appendices and copies of educational and publicity materials.

20214 (EPRI-AP—2795) **Siting guidelines for utility application of wind turbines. Final report.** Pennell, W.T. (Pacific Northwest Lab., Richland, WA (USA)). Jan 1983. Contract AC06-76RL01830. 263p. NTIS, PC A12/MF A01. Order Number DE83007428.

Utility-oriented guidelines are described for identifying viable sites for wind turbines. Topics and procedures are also discussed that are important in carrying out a wind turbine siting program. These topics include: a description of the Department of Energy wind resource atlases; procedures for predicting wind turbine performance at potential sites; methods for analyzing wind turbine economics; procedures for estimating installation and maintenance costs; methods for anlayzing the distribution of wind resources over an area; and instrumentation for documenting wind behavior at potential sites. The procedure described is applicable to small and large utilities. Although the procedure was developed as a site-selection tool, it can also be used by a utility who wishes to estimate the potential for wind turbine penetration into its future generation mix.

20215 (GKSS—82/E/48) **Comparative examination of operating conditions of wind energy converters in the 10kW output class.** Fries, S.; Bruegmann, J.; Petersen, G.; Mengelkamp, H.T. (GKSS-Forschungszentrum Geesthacht G.m.b.H., Hamburg (Germany, F.R.)). 1982. 40p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83901590.

GKSS is operating a test filed for wind energy converters at the North Sea island of Pellworm. The test field, especially its technical equipment, and the installed wind energy converters are described. The operation experiences and the test results of the first two years of operation are reported. The test results of the AEROMAN and the WINDMATIC plants are discussed as an example for the test methodology at Pellworm.

20216 (ISD—272) **Static and dynamic investigations for the model of a wind rotor.** Argyris, J.H.; Braun, K.A.; Kirchgaessner, B.; Walther, R. (Stuttgart Univ. (Germany, F.R.). Inst. fuer Statik und Dynamik der Luft- und Raumfahrtkonstruktionen). 1980. 64p. Available from Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe (Germany, F.R.).

A model of a wind rotor was constructed in order to develop and test a new data-acquisition and data-transport system. With this system it is possible to collect experimental data from the operating model and display them on a screen. The comparison between the experimental data and the computed results for the model can be used to check the applied computation methods. The static and dynamic analysis of the rotor model is discussed and the results are compared with experimental data. During the dynamic analysis a response problem with variable stiffness in time was found. For this problem a solution method for systems of equations is described.

20217 (Juel-Spez—71, pp 1-35) **Measurement system used at the Gedser windmill-purpose, performance and experience.** Lundsager, P. Mar 1980. Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe, Germany, F.R.

From 3. meeting of experts - data acquisition and analysis for large scale wind energy conversion systems; Blowing Rock, NC, USA (26 - 27 Sep 1979).

Summarized are the experiences gathered with the measurement system used in a series of measurements made on the Gedser windmill during the period Oct. 1977 - Apr. 1979. The layout of the system and the measurement procedures used are motivated and described, and the performance of the system is evaluated.

20218 (Juel-Spez—71, pp 37-55) **GROWIAN test program.** Hau, E. Mar 1980. Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe, Germany, F.R.

From 3. meeting of experts - data acquisition and analysis for large scale wind energy conversion systems; Blowing Rock, NC, USA (26 - 27 Sep 1979).

The large Wind Energy Plant GROWIAN is designed as a typical plant with respect to power output and technical design to deliver a considerable contribution to electric power need in the Federal Republic of Germany. This contribution should be achieved by a great number of identical units. Therefore GROWIAN is planned as a prototype and not as an experimental plant. On the other hand GROWIAN is of such a size, that a variety of technical problems is involved, which only can be solved experimentally. For this reason it is foreseen to carry out a test program in connection with the qualification phase. The outline of this test program has recently started. The objectives, the measurement methods and the hardware will be studied in more detail. The objectives of the test program are described with respect to the power output measurements.

20219 (Juel-Spez—71, pp 57-73) **Wind turbine data system.** Neustadter, H.; Wolf, R. Mar 1980. Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe, Germany, F.R.

From 3. meeting of experts - data acquisition and analysis for large scale wind energy conversion systems; Blowing Rock, NC, USA (26 - 27 Sep 1979).

Published in summary form only.

20220 (Juel-Spez—71, pp 75-108) **Evaluation of the prototype project of the Swedish wind energy programme.** Johansson, P.A. Mar 1980. Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe, Germany, F.R.

From 3. meeting of experts - data acquisition and analysis for large scale wind energy conversion systems; Blowing Rock, NC, USA (26 - 27 Sep 1979).

The prototype project is the major part of the Swedish wind energy programme. The project comprises concept studies followed by design, erection and evaluation of two large scale horizontal axis WECS. Together with other projects in the wind energy programme, the purpose of this project is to provide basic information for a possible decision in the direction of large scale utilization of wind energy in Sweden. This decision is scheduled to be made around 1985. The project has now reached the implementation phase.

20221 (Juel-Spez—71, pp 109-141) **Measuring program for two windmills at Nibe, Denmark.** Nielsen, P. Mar 1980. Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe, Germany, F.R.

From 3. meeting of experts - data acquisition and analysis for large scale wind energy conversion systems; Blowing Rock, NC, USA (26 - 27 Sep 1979).

Also presented at: IEA expert meeting on LS-WEC's, Sep 26-27, 1979, Boone, NC, USA.

After a short description of the two windmills being built at Nibe, Denmark, the main strategy for the measuring program is outlined. The physical lay-out of the measuring system is also described. Signals from about one hundred sensors are going to be processed in a PDP 11/34 computer, and the computed values are to be displayed on a printer/plotter or a CRT-screen. At the time of writing the mills have not been put into final operation, so practical results are not yet available.

20222 (Juel-Spez—71, pp 143-165) **Measurement of wind conditions and load in the GROWIAN project.** Koerber, F. Mar 1980. Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe, Germany, F.R.

From 3. meeting of experts - data acquisition and analysis for large scale wind energy conversion systems; Blowing Rock, NC, USA (26 - 27 Sep 1979).

Discussed are planned measurements on the German wind energy converter GROWIAN which will operate in the early eighties. GROWIAN is a large scale wind machine with 100 m tower and a 100 m two-bladed rotor. Rating is 3 MW. A survey is given on two themes treating wind conditions and load and stress on the machine and its components. There are as yet no experimental results available. Wind condition will be evaluated by an arrangement consisting of three wind measuring towers 150 m, respectively 160 m high. One standing 570 m in front of GROWIAN, a pair of towers standing 70 m in front. Strain gauges, accelerometers and other equipment are used for load and stress evaluation.

20223 (Juel-Spez—71, pp 167-186) **Review of gust model concepts.** Powell, D.C. Mar 1980. Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe, Germany, F.R.

From 3. meeting of experts - data acquisition and analysis for large scale wind energy conversion systems; Blowing Rock, NC, USA (26 - 27 Sep 1979).

Three wind component gust models, each representing a somewhat different concept, are reviewed.

20224 (Juel-Spez—71, pp 187-194) **Correlation of wind velocity and power output from field measurements on wind turbines.** Pedersen, B.M. Mar 1980. Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe, Germany, F.R.

From 3. meeting of experts - data acquisition and analysis for large scale wind energy conversion systems; Blowing Rock, NC, USA (26 - 27 Sep 1979).

A brief account is given of the problems involved in getting pertinent aerodynamic and aerodynamically derived characteristics of wind turbines from field measurements. In particular the methods for determining the proper power versus wind-speed correlation are reviewed.

20225 (Juel-Spez—71, pp 207-228) **Siting technologies for large wind turbine clusters.** Hiester, T.R.; Pennell, W.T. Mar 1980. Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe, Germany, F.R.

From 3. meeting of experts - data acquisition and analysis for large scale wind energy conversion systems; Blowing Rock, NC, USA (26 - 27 Sep 1979).

The objective of the U.S. Federal Wind Energy Program is '... to accelerate the development, commercialization and utilization of reliable and economically viable wind energy systems' (ERDA 1977). To achieve this objective, the program is organized into several elements. The Wind Characteristics Program Element (WCPE), one of these elements, is managed for the U.S. Department of Energy (DOE) by Pacific Northwest Laboratory (PNL). PNL has the specific responsibility for providing the appropriate information on wind characteristics to those involved in: Energy program planning and energy resource analysis; selection of sites for wind energy conversion systems (WECS); design and performance evaluation of WECS; day-to-day operations of WECS (Wendell et al. 1978). Applied research and development within the WCPE currently focus on: Developing effective siting technologies; defining the wind energy resource; providing information on wind structure and turbulence to designers; investigating wind-forecasting techniques that would improve the integration of wind turbines with existing electrical networks. This paper discusses the first of these activities as applied to large wind turbine clusters and describes a possible site-selection strategy for a large public utility that is considering the inclusion of WECS into its mix of generating equipment.

20226 (Juel-Spez—71, pp 229-245) **Two methods for correlating wind measurements with the power output of a 200 kw MOD-OA wind turbine.** Richards, T.R. Mar 1980. Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe, Germany, F.R.

From 3. meeting of experts - data acquisition and analysis for large scale wind energy conversion systems; Blowing Rock, NC, USA (26 - 27 Sep 1979).

1. Two methods (short term and long term) for correlating wind turbine power output and free-stream wind speeds have been presented. 2. Instantaneous correlation of power output with free-stream wind speeds is achieved using the short-term method. 3. Long-term correlation of measured and calculated average power while synchronized is achieved using the long-term method. 4. Both methods show good correlation between calculated and measured performance of the Clayton, New Mexico MOD-OA wind turbine.

20227 (Juel-Spez—71, pp 247-261) **Engineering assessment of existing wind models for the design of large WEC's.** Meggle, R. Mar 1980. Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe, Germany, F.R.

From 3. meeting of experts - data acquisition and analysis for large scale wind energy conversion systems; Blowing Rock, NC, USA (26 - 27 Sep 1979).

The designer of large WEC's is faced with the fact that the system he designs will be driven from the wind in the height region between 40 and 200 m. The bulk of existing wind data was measured in heights between 8 and 40 m. A survey is given of existing wind models to be applied to the mentioned operational height region. Critical assessment of the models validity is made and recommended areas for further investigations are identified.

20228 (Juel-Spez—71, pp 263-271) **DOE candidate site meteorological measurement program.** Renne, D.S. Mar 1980. Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe, Germany, F.R.

From 3. meeting of experts - data acquisition and analysis for large scale wind energy conversion systems; Blowing Rock, NC, USA (26 - 27 Sep 1979).

A primary goal of the U.S. Department of Energy (DOE) is the rapid commercialization of wind energy. One way that DOE is achieving this goal is by installing prototype wind turbines on sites proposed by electric service organizations. The utilities field test and operate these turbines for a period of several years and use the electricity produced by the turbines in their electrical network. In March of 1976, DOE issued an RFP to acquire, on a competitive basis, a group of candidate sites, proposed by utilities interested in the field testing program. Meteorological measuring equipment would be installed by DOE on these candidate sites to assess the wind energy potential at the site. As prototype machines reach a stage of development where an installation site is needed, a site would be chosen competitively from among these candidate sites. A total of 17 candidate sites were selected from the 64 proposals submitted in response to the RFP. From these sites, five have been chosen thus far to receive turbines for field testing. The meteorological measurement activities at these sites are discussed and details of the measurement program as it exists in late 1979 are provided. In addition, the directions this program will take in the near future, and the options interested electric service organizations have for participating in the program are discussed briefly.

20229 **(N—82-19681) Feasibility study on a low power vertical axis wind-powered generator.** Crook, W.R.; Puust, T.; Robinson, M.L.; Vencel, L.J. (Advanced Engineering Lab., Salisbury (Australia)). Sep 1980. 102p. NTIS, PC A06/MF A01.

Investigations carried out to establish a design concept for a 1 kW wind-powered generator suitable for use as an alternative power source in isolated locations is described. Design criteria include high power to weight ratio, simplicity of assembly, and potential for fixed, mobile or portable applications. A suitable configuration using a Darrieus straight blade rotor with a microprocessor based control system is proposed. Information on the power output to be expected in different wind environments is provided.

20230 **(NASA-SP—455) Capturing energy from the wind.** Schefter, J.L. (National Aeronautics and Space Administration, Washington, DC (USA)). 1982. 86p. GPO.

The history of the harnessing of wind power and basic facts about the wind and wind machines are discussed. The small machines, the large turbines, and the direction for the future are described. (MHR)

20231 **(NASA-TM—82594) Aluminum blade development for the MOD-OA 200-kilowatt wind turbine. Final report.** Linscott, B.S.; Shaltens, R.K.; Eggers, A.G. (National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center). Dec 1981. 43p. NTIS, PC A03/MF A01.

The rotor blade configuration, fabrication methods, analyses, operating experience, design modifications, and cost are described. Each 60-ft.-(18.3-m-) long aluminum blade used current aircraft fixed wing and rotary wing design and fabrication technologies. Structural damage, repairs, and modifications that occurred during 6500 hours of operation are summarized.

20232 **(NP—3900023) Rotor blade profiles for wind turbines.** Wortmann, F.X. (Stuttgart Univ. (TH) (Germany, F.R.). Inst. fuer Aerodynamik und Gasdynamik). Aug 1978. 22p. (In German). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83900023.

Requirements on blade profiles, suitable profiles, and results of measurements with small and large angles of attack are presented. Rough profiles, momentum coefficients, permissible roughnesses, and avoidance of roughness due to insect impact are mentioned.

20233 **(NP—3901233) Review of the literature on promotion of windpumps.** Rastogi, T. (Tata Energy Research Inst., Bombay (India). Documentation Centre). Jun 1982. 47p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83901233.

A review of the literature on small windmills is presented with emphasis on: (1) use of the windmill for water pumping; and (2) use of the windmill in developing countries with limited funds and resources. Topics discussed include: (1) wind resources and availability; (2) status of the technology; (3) design and fabrication of windpumps; (4) economics; (5) social and environmental considerations; and (6) national and institutional measures. It is recommended that a wind resource inventory be undertaken in all countries having some wind energy prospects and that a centralized policy-making group should oversee all aspects of wind energy projects. 38 references. (MJJ)

20234 **(PNL-SA—10653) New look at turbulence experienced by a rotating wind turbine.** Connell, J.R.; George, R.L. (Pacific Northwest Lab., Richland, WA (USA)). Aug 1982. Contract AC06-76RL01830. 31p. (CONF-830108—3). NTIS, PC A03/MF A01. Order Number DE83007044.

From 6. ASME energy sources technology conference and exhibition; Houston, TX, USA (30 Jan 1983).

It is demonstrated that the wind that drives a wind turbine is correctly characterized only if the basic time series of wind is obtained by rotationally sampling the wind around the disc of the rotor. The approach that has been taken to characterize the rotationally sampled wind is described, and a set of simpler approximations are compared to the full rotationally sampled wind at a vertical plane array of anemometers. An example is given of the spectrum of rotationally sampled wind measured in the wake of a 200 kW MOD 0A1 wind turbine. A second example shows the importance of rotationally analyzing the wind before calculating probability density distributions of gust amplitudes. A theoretical model of the spectrum of the rotationally sampled wind is compared with an observed spectrum from the rotationally sampled wind at the vertical plane array of anemometers. (LEW)

20235 **(PNL-SA—10890) Operations requirements of utilities with wind-power generation.** Powell, D.C.; Chan, S.M.; Yoshimura, M.; Curtice, D.H. (Pacific Northwest Lab., Richland, WA (USA); Systems Control, Inc., Palo Alto, CA (USA)). Nov 1982. Contract AC06-76RL01830. 11p. (CONF-830107—3). NTIS, PC A02/MF A01. Order Number DE83007051.

From IEEE Power Engineering Society winter meeting; New York, NY, USA (31 Jan 1983).

A computational method and the necessary wind-speed data are presented in this paper for quantifying in a probabilistic framework the load-following, operating-reserve and unloadable-generation requirements for a utility with one or more spatially dispersed wind-turbine clusters. Results of this method are valid for random atmospheric conditions, excluding significant atmospheric events such as storm fronts. An example illustrating the proposed method is included.

20236 **(RFP—3383) Wind-systems technical notes: 1981.** Shuler, S.A. (comp.). (Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant). Mar 1982. Contract AC04-76DP03533. 214p. NTIS, PC A10/MF A01. Order Number DE83007202.

Eleven technical notes produced by the Rocky Flats Wind Systems Program in 1981 are compiled to document specialized tests of small wind systems and other investigations. Subjects include: controlled velocity tests, dynamometer tests, failure analysis, design of a digital speed control circuit for induction wind turbine generators and collection of wind turbine generator rpm data via an FM wireless intercom system.

20237 **(RFP—3449) Interfacing a Gemini synchronous (line-commutated) inverter with a local utility and a mini-grid: test results.** (Rockwell International Corp., Golden, CO (USA). Wind Energy Research Center). Oct 1981. Contract AC04-76DP03533. 52p. NTIS, PC A04/MF A01. Order Number DE83007198.

Data generated by interfacing a single-phase synchronous (line-commutated) inverter to a local utility and to a minigrid which simulated a 25 percent utility penetration are presented. Line-commutated synchronous inverters are used by some wind systems manufacturers for interfacing the direct current or rectified alternating current output of wind-turbine generators directly to utility ac power lines.

20238 **(SERI/TP—211-1851) Analysis of the potential of the electrofluid dynamic wind-driven generator.** Mitchell, R. (Solar Energy Research Inst., Golden, CO (USA)). Jan 1983. Contract AC02-77CH00178. 8p. (CONF-830405—10). NTIS, PC A02/MF A01. Order Number DE83005712.

From 6. annual ASME technical conference on commercial building heating and cooling applications; Orlando, FL, USA (19 Apr 1983).

The Electrofluid Dynamic wind-driven generator has been investigated under government supported programs since 1975. The concept features the direct conversion of wind energy into electrical power with virtually no moving parts. Research on this concept has resulted in a detailed operational theory of electrofluid systems and a preliminary conceptual design of a full-scale generator. Analysis of the potential of this concept has established a range for the value indicators and an understanding of its optimization potential and uncertainty. A comparison is made between the value indicators for the Electrofluid Dynamic concept and those of several conventional WECS.

20239 (SERI/TR—635-1280) **Windmill wake turbulence decay: a preliminary theoretical model.** Bossanyi, E.A. (Solar Energy Research Inst., Golden, CO (USA)). Feb 1983. Contract AC02-77CH00178. 31p. NTIS, PC A03/MF A01. Order Number DE83008162.

The results are given of initial theoretical attempts to predict dynamic wake characteristics, particularly turbulence decay, downstream of wind turbine generators in order to assess the potential for acoustic noise generation in clusters or arrays of turbines. These results must be considered preliminary, because the model described is at least partially based on the assumption of isotropy in the turbine wakes; however, anisotrpic conditions may actually exist, particularly in the near-wake regions. The results indicate that some excess spectral energy may still exist. The turbine-generated turbulence from one machine can reach the next machine in the cluster and, depending on the turbulent wavelengths critical for acoustic noise production and perhaps structural excitation, this may be a cause for concern. Such a situation is most likely to occur in the evening or morining, during the transition from the daytime to the nocturnal boundary layer and vice-versa, particularly at more elevated sites where the winds tend to increase after dark.

20240 (TR-EE—82-26) **Development of a reduced-order functional representation of an alternator-rectifier excitation system.** Chen, C. (Purdue Univ., Lafayette, IN (USA). School of Electrical Engineering). Aug 1982. Contract AC02-77ET29100. 70p. NTIS, PC A04/MF A01. Order Number DE83006437.

Excitation system models typically employed in power system computations are typically valid only for small changes in rotational speed and only for slowly varying system oscillations. Recent research has uncovered several situations where the range of accuracy associated with existing excitation system models is exceeded. A tractable, functional representation of a specific class of excitation systems is developed. The accuracy of this simplified model is evaluated by comparing the steady state and dynamic characteristics of the simplified model with a highly detailed excitation system representation. The simplified model is shown to be reasonably accurate over a wide range of operating conditions.

20241 (WAESD-TME—3180) **Investigation of doubly-fed machine in variable speed applications: control verification.** Andersen, T.S.; Hughes, P.S.; Mutone, G.A. (Westinghouse Electric Corp., Pittsburgh, PA (USA). Advanced Energy Systems Div.). Mar 1983. Contract AC02-81RA50292. 101p. NTIS, PC A06/MF A01. Order Number DE83008291.

The generator control system for a doubly-fed wind machine in variable speed applications is described. The control system has been assembled and its performance has been tested with a hybrid computer simulation of a wind turbine drive train. The generator is composed of an excitation controller and a cycloconverter controller. (LEW)

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REFER ALSO TO CITATION(S) 19412, 19423, 19497, 19537, 19538, 19626, 19629, 19630, 19670, 19718, 20474, 20817, 20818, 20819, 20820, 20821, 20823, 20825, 20870, 20874, 20878, 20878, 21425

20242 (ANL/FE—80-10) **Sulfur control in fluidized-bed combustors: methodology for predicting the performance of limestone and dolomite sorbents.** Fee, D.C.; Myles, K.M.; Wilson, W.I.; Fan, L.S.; Smith, G.W.; Wong, S.H.; Shearer, J.A.; Lenc, J.F.; Johnson, I. (Argonne National Lab., IL (USA)). Sep 1982. Contract W-31-109-ENG-38. 448p. NTIS, PC A19/MF A01. Order Number DE83007658.

The ANL methodology significantly simplifies predictions of sulfur capture in fluidized-bed coal combustors. This section summarizes how to use the methodology to make predictions. The details of the method development and supporting data are given in the later sections. In addition, comparisons between predicted sorbent performance and actual FBC plant data are shown to support the methodology. The method adequately describes the experimental results and thus can be used with some confidence to compare sorbent performance, provided, of course, that the limitations of the methodology are recognized.

20243 (ANL/NESC—306) **FCC4; fundamental mode fast reactor cross section calculations.** Little, W.W.; Hardie, R.W. (Pacific Northwest Lab., Richland, WA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048306.

FCC4 will handle up to 40 energy groups and 10 downscattering terms with 14 isotopes.

FCC4 is a multipurpose data manipulation code for use in fast reactor analysis. The code can be used to - (a) compute resonance-shielded cross sections using data in the Russian format (shielding factors and infinite-dilution cross sections), (b) compute multigroup fundamental-mode flux and adjoint flux, (c) compute and punch group-collapsed microscopic or macroscopic cross sections in the DTF format, (d) compute fuel burnup at constant flux or power density.UNIVAC1108; FORTRAN IV; 65K memory.

20244 (ANL/NESC—914R) **PESTS; thermo-hydraulic system data analysis.** Bordner, G.L. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048914.

PESTS is a statistical model for the analysis of steady-state thermo-hydraulic data from experimental loops or operating power plants. The analysis, based on estimation theory, provides a means for improving the accuracy of estimates of system parameters and for resolving small discrepancies in system heat balances. Additionally, when significant errors are present in the data, this model provides an indication of which sensors are suspect. User-supplied input to the PESTS (Parameter Estimation in Steady Thermal Systems) program consists of steady-state data from a thermo-hydraulic system along with error estimates for the sensors and a set of simple equations, such as component heat balances, which describe the system. Using statistical techniques, the program determines revised estimates of the system parameters which are more accurate than the raw data and which can be used as a basis for verifying the accuracy of individual sensors. PESTS was developed for the analysis of experimental data from the Sodium Loop Safety Facility (SLSF) but is adaptable to other systems.IBM370,303x; FORTRAN IV; OS/370; 70K bytes of memory are required for execution.

20245 (CONF-820966—2) **Review of gas cleanup systems for fluidized-bed coal combustors.** Henry, R.F.; Podolski, W.F.; Saxena, S.C. (Argonne National Lab., IL (USA); Illinois Univ., Chicago (USA). Dept. of Energy Engineering). 1982. Contract W-31-109-ENG-38. 8p. NTIS, PC A02/MF A01. Order Number DE83007711.

From 3. world filtration congress; Downington, PA, USA (13 Sep 1982).

In recent years, gas cleanup systems consisting of a number of cyclones, cyclones in conjunction with another device such as a fabric filter, granular bed, or electrostatic precipitator, have been used to remove particulates from the high temperature gas stream leaving fluidized bed coal combustors at both low and high pressure. These studies are reviewed here to infer the relative success of each type of cleanup system from the perspective of cleanup requirements for expansion of the gas through a gas turbine and additionally from the perspective of emission standards established by the Environmental Protection Agency.

20246 (CW-WR—76-020.104A) High-Temperature Turbine-Technology Program. Phase II. Technology test and support studies. Design and development of a regeneratively fuel cooled high temperature gas turbine combustor for operation on low Btu gas. (Curtiss-Wright Corp., Wood-Ridge, NJ (USA). Power Systems Div.). Jul 1982. Contract AC01-76ET10348. 167p. NTIS, PC A08/MF A01. Order Number DE83007342.

The fuel-air requirements for low Btu gas combustors result in a paucity of cooling air which results in low Btu gas-fueled air cooled combustor designs with annular configurations with complex flow path schemes to maximize cooling efficiency. These design trends are in the direction of reduced maintainability and reliability. Alternatively, if the low Btu gas can be utilized as a cooling medium before it is combusted, conventional multiple can arrangements with simple convection-cooled liner can be developed. This report describes the design, fabrication and test of a full scale industrial gas turbine burner can with convective cooling of the liner wall by 150 Btu/scf gaseous fuel typical of air-blown gasification of coal. The entire primary combustion zone burner wall surface area was cooled with 375°F LBG fuel, which after cooling the wall was reinjected for combustion. The fuel gas cooling passage is a concentric annulus of nominal .140" height, designed to limit linear temperature to a maximum of 1200°F at approximately 4% gas supply pressure loss. The 10-in. internal diameter combustor can was successfully operated up to 6 atmospheres pressure, burning 150 Btu/scf gaseous fuel up to 3000°F average exit temperature. The fuel cooling effect and combustor exit emissions levels were determined for gas supply temperatures of 150 and 375°F. All liner temperature measurements were well below the average 1200°F estimated for the 3000°F design point. This was confirmed by post-test visual inspection of all components which were found in excellent condition. In addition, the NO/sub x/ emissions level at the nominal 3000°F combustor exit temperature was substantially below the EPA regulatory level of 75 ppM when adjusted for pressure level effect of 15 atm and 15% oxggen.

20247 (DOE/AD/11209—T14) Final technical report on the development of cogeneration options at DOE facilities. (Vineta, Inc., Falls Church, VA (USA)). 21 Jan 1983. Contract AC01-81AD11209. 160p. NTIS, PC A08/MF A01. Order Number DE83005222.

This report summarizes professional services rendered by Vineta, Inc. in th development of viable cogeneration options at a number of DOE facilities. It describes in some detail the genesis of these projects and the lessons learned. Most importantly, it rank orders the projects under consideration in economic terms; all of them have very favorable return over investment ratios and payback periods. Bottoming cycles at the Richland 100 N Reactor show the greatest promise.

20248 (DOE/EIA—0035(82/10), pp i-vii) **Impacts of financial constraints on the electric utility industry.** O'Brien, B. (Energy Information Administration, Washington, DC). Oct 1982. NTIS, PC A06/MF A01.

In Monthly energy review.

Two possible futures for the utility industry through 1995 are examined to illustrate the potential impacts of financial constraints on the industry as a whole. In one case, it is assumed that electric utilities obtain the capital needed to finance all new construction currently planned and any additional powerplants justified by economics. In the second case, it is assumed that the current financial situation remains the same, and that electric utilities construct only those facilties for which they already have a major financial commitment. Projections of supply adequacy, utility fuel use, electricity prices, and capital expenditures are compared for each case.

20249 (DOE/EIA—0075(82/02)) Cost and quality of fuels for electric utility plants. (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Feb 1982. 69p. NTIS, PC A04/MF A01. Order Number DE83008020.

This report is designed to provide information about the cost and quality of fossil fuels received at electric utility generating units in the 48 contiguous states and the District of Columbia. The publication is geared to a variety of applications by electric utilities, industry, consumers, educational institutions, and government in recognition of the growing importance of energy planning in contemporary society. This report contains fuel cost, quality, and quantity data aggregated at the state and regional levels beginning with Table 6, while 12-month tables are presented only at the regional level. Table 33 contains this information at the plant levels, listed alphabetically by company. In addition to steam-electric unit information, this report contains information on fuels received at peaking units: combustion turbines, internal combustion (diesel) engines, and combined-cycle units. Only fossil-fueled plants with a combined capacity of 25 megawatts or greater are covered in this report.

20250 (DOE/EIA—0075(82/03)) Cost and quality of fuels for electric utility plants. (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Mar 1982. 66p. NTIS, PC A04/MF A01. Order Number DE83008019.

This report is designed to provide information about the cost and quality of fossil fuels received at electric utility generating units in the 48 contiguous States and the District of Columbia. It is also intended to provide information in a concise format to satisfy the needs of a wide variety of audiences. The publication is geared to a variety of applications by electric utilities, industry, consumers, educational institutions, and government in recognition of the growing importance of energy planning in contemporary society. This report contains monthly fuel cost, quality, and quantity data aggregated at the State and regional levels. 12-month tables are presented only at the regional level, with information at the plant level, listed alphabetically by company. In addition to steam-electric unit information, this report contains information on fuels received at peaking units: combustion turbines, internal combustion (diesel) engines, and combined-cycle units. Only fossil-fueled plants with a combined capacity of 25 MW or greater are covered. Data in the accompanying tables were compiled from monthly reports filed by electric utility companies.

20251 (DOE/EIA—0075(82/06)) Cost and quality of fuels for electric utility plants. (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Jun 1982. 67p. NTIS, PC A04/MF A01. Order Number DE83008007.

This report is designed to provide information about the cost and quality of fossil fuels received at electric utility generating units in the 48 contiguous States and the District of Columbia. It is also intended to provide information in a concise format to satisfy the needs of a wide variety of audiences. The publication is geared to a variety of applications by electric utilities, industry, consumers, educational institutions, and government in recognition of the growing importance of energy planning in contemporary society. This report contains monthly fuel cost, quality, and quantity data aggregated at the State and regional levels. 12-month tables are presented only at the regional level, with information at the plant level, listed alphabetically by company. In addition to steam-electric unit information, this report contains information on fuels received at peaking units: combustion turbines, internal combustion (diesel) engines, and combined-cycle units. Only fossil-fueled plants with a combined capacity of 25 MW or greater are covered. Data in the accompanying tables were compiled from monthly reports filed by electric utility companies.

20252 (DOE/EIA—0075(82/07)) Cost and quality of fuels for electric utility plants. (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Jul 1982. 67p. NTIS, PC A04/MF A01. Order Number DE83008008.

This report is designed to provide information about the cost and quality of fossil fuels received at electric utility generating units in the 48 contiguous States and the District of Columbia. It is also intended to provide information in a concise format to satisfy the needs of a wide variety of audiences. The publication is geared to a variety of applications by electric utilities, industry, consumers, educational institutions, and government in recognition of the growing importance of energy planning in contemporary society.

This report contains monthly fuel cost, quality, and quantity data aggregated at the State and regional levels. 12-month tables are presented only at the regional level, with information at the plant level, listed alphabetically by company. In addition to steam-electric unit information, this report contains information on fuels received at peaking units: combustion turbines, internal combustion (diesel) engines, and combined-cycle units. Only fossil-fueled plants with a combined capacity of 25 MW or greater are covered. Data in the accompanying tables were compiled from monthly reports filed by electric utility companies.

20253 (DOE/EIA—0075(82/08)) **Cost and quality of fuels for electric utility plants.** (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Aug 1982. 66p. NTIS, PC A04/MF A01. Order Number DE83008027.

This report is designed to provide information about the cost and quality of fossil fuels received at electric utility generating units in the 48 contiguous states and the District of Columbia. The publication is geared to a variety of applications by electric utilities, industry, consumers, educational institutions, and government in recognition of the growing importance of energy planning in contemporary society. This report contains monthly fuel cost, quality, and quantity data aggregated at the state and regional levels beginning with Table 6, while 12-month tables are presented only at the regional elvel. Table 33 contains this information at the plant level, listed alphabetically by company. Data for 1981 presented herein are revised and final. In addition to steam-electric unit information, this report contains information on fuels received at peaking units: combustion turbines, internal combustion (diesel) engines, and combined-cycle units. Only fossil-fueled plants with a combined capacity of 25 megawatts or greater are covered in this report.

20254 (DOE/EIA—0095(81)) **Inventory of power plants in the United States. 1981 annual.** (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Sep 1982. 314p. NTIS, PC A14/MF A01. Order Number DE83008029.

Tabulated and graphic data for 1981 are presented on existing and projected US power plants. First, summary information is arranged by primary fuel, existing capacity, number of existing units, projected capacity, and number of projected units. Sections appear for the 50 United States and the District of Columbia, and for individual states listed in alphabetical order. Sections are also provided for summaries by NERC (National Electric Reliability Council) regions, census regions, and federal regions. Second, a comprehensive list of power generating units in the US and District of Columbia is presented with data on existing, projected, cancelled, shut-down, postponed, retired, and standby units. This information is categorized by state, company, plant and unit, in that order. Generating units are described by nameplate capacity, unit type, and primary and alternative fuel source. In addition information is provided on current operating status of units, as well as dates of initial production. Third, data are presented on jointly owned US power plants. The information is sub-divided by state, company, plant and unit. Names of joint utility owners and percentage of ownership are presented. Generating units are also described by nameplate capacity, unit type, primary and alternative fuel use, current operating status and dates of initial production. Finally, data are provided on planned or under construction power plants. The information is sub-divided by state, company, plant name, location, unit number, and current and originally scheduled completion date. In addition data is supplied on nameplate capacity, unit type, and primary fuel to be used. It is also possible to determine whether plant's environmental impact statement has been prepared, drafted, or is in final form. (LCL)

20255 (DOE/ER/10766—9) **Mitigation of biofouling using coatings, year 3. Quarterly progress report No. 1.** Meyer, A.E.; Fornalik, M.S.; King, R.W. (Arvin Calspan, Buffalo, NY (USA). Applied Technology Group). 20 Dec 1982. Contract AC02-80ER10766. 11p. NTIS, PC A02/MF A01. Order Number DE83004070.

Preliminary results (critical surface tension, final contact potential, and film thickness) of the freshwater experiments are given. The critical surface tension (γc) data are very similar to the results for the brackish Hudson River exposures: both the high energy and the medium energy surfaces acquired films having γc's in the 20's (dynes/cm) during the early stages of the experiment. These films were predominantly proteinaceous. As soon as mineral deposition was established, the γc's of all of the test surfaces increased to between 40 and 45 dynes/cm. In general, the final contact potentials of the test plates increased through time; the average values were 300 to 500 millivolts higher than those observed in the Hudson experiments. To date, all of the film thicknesses for the Niagara River experiments are 1000 Angstroms or less (even after 20 days of exposure). Plates exposed to the Hudson water acquired films of this thickness within only 5 days.

20256 (DOE/MC/14110—1227) **Alexandria fluidized-bed process-development unit. Hot-mode testing .** (Burns and Roe Services Corp., Oradell, NJ (USA); BENMOL Corp., Alexandria, VA (USA)). Dec 1982. Contract AC21-80MC14110. 205p. NTIS, PC A10/MF A01. Order Number DE83005061.

The objectives of the current test program include validation of predictions from the Massachusetts Institute of Technology (MIT) Atmospheric Fluidized Bed Coal Combustor System Model, continuation of experimental studies supporting AFBC process development, and collection of transient data for later process control studies. This topical report summarizes results from hot mode testing, i.e., experiments performed with combustion in the Process Development Unit for Model verification. During these tests, coal and limestone were fluidized and combusted with air at temperatures ranging from 1400 to 1580°F in the 3′ x 3′ (nominal) size Process Development Unit (PDU) at Alexandria, Virginia. MIT Model predictions tested include: combustion efficiency, carbon loading, gas and solids concentrations, bed temperature, expanded bed height, overall heat transfer coefficient and sulfur retention by the coal/limestone system. Although not corresponding exactly, the Model predictions and experimental values for the overall heat transfer coefficients were relatively close in agreement. In all other cases, there were some discrepancies between the Model predictions and corresponding experimental PDU results. Transient process data were collected by the Data Acquisition System (DAS). Six parameters were recorded continuously on a six channel recorder. Variances were observed in the recorded transient data in response to input step changes.

20257 (DOE/MC/14129—1312) **IEA Grimethorpe Pressurized Fluidised Bed Test Facility incident report: history of erosion on the primary and secondary quench vessel vent valves.** (NCB (IEA Grimethorpe) Ltd., Grimethorpe (UK)). Mar 1982. Contract AC21-80MC14129. 16p. NTIS, PC A02/MF A01. Order Number DE83005883.

The original vent valves installed on the primary and secondary quench vessels have experienced extensive internal erosion. The report provides details of the engineering work that has been undertaken to overcome the problem. Modifications were made to the valves during hot commissioning in order to reduce the erosive action, but these did not produce a significant improvement. During Test Series One, an alternative valve arrangement was installed which proved successful, and identical valves will be installed at the other locations for Test Series Two. The problem of erosion of the vent valves is likely to be specific only to the wet ash disposal system at the Grimethorpe Facility, as a commercial plant would probably utilize a dry system without the associated cyclone blowdown and venting requirement.

20258 (DOE/MC/14129—1313) **Fluidised-bed combustion: IEA Grimethorpe pressurized fluidized-bed test facility incident report - combustor water wall damage during operation on March 17, 1981.** (NCB (IEA Grimethorpe) Ltd., Grimethorpe (UK)). Apr 1982. Contract AC21-80MC14129. 19p. NTIS, PC A02/MF A01. Order Number DE83005881.

This report describes the incident of water leakage into the combustor during hot commissioning of the Facility in March, 1981. Leakage occurred from the water walls and the risers feeding the in-bed tube bank. It was concluded that air leakage through the seal arrangement, between te distributor plate and the water walls, impinged on the water wall and caused erosion tat led to failure.

Modifications were undertaken to improve the seal, which have proved satisfactory during Test Series I. Test Series II sees a change in design, with the seal being elimianted by the welding of the distributor plate directly to the water walls.

20259 (DOE/MC/14129—1314) Fluidised Bed Combustion Project, Grimethorpe Experimental Facility. (NCB (IEA Grimethorpe) Ltd., Grimethorpe (UK)). Mar 1982. Contract AC21-80MC14129. 24p. NTIS (US Sales Only). Order Number DE83005882.

The report presents the findings of an investigation into the freeboard cooler failure, in November 1981. The freeboard cooler was installed in the freeboard zone at the top of the combustor and the design intent was to operate so as to ensure the off-gas temperature did not exceed 900°C. During Test Series One, the freeboard temperature never reached 900°C, but the cooler was operated to reduce the exit flue gas temperature from the main heat exchanger to below the maximum allowable working temperature of the ductwork downstream of the exchanger. The cooler failed when several cracks appeared on bends in the air space between the combustor pressure shell and furnace water wall. A description of the cooler is provided along with details of its function, design, fabrication, commissioning and operation. The failure is described, and causes of failure are discussed. The report concludes that the failure occurred due to stress corrosion cracking.

20260 (DOE/MC/14129—1315) Fluidised-bed combustion: IEA Grimethorpe pressurized fluidised-bed test facility incident report - booster-compresser failure. (NCB (IEA Grimethorpe) Ltd., Grimethorpe (UK)). Apr 1982. Contract AC21-80MC14129. 19p. NTIS, PC A02/MF A01. Order Number DE83005865.

This report presents the findings of an investigation into the booster compressor failure, in October 1981. The compressor failed when a blade of the expander stage impeller fractured. The report concludes that the damage was probably caused by either the ingress of foreign particles or fatigue failure of the blade. Further metallurgical investigations of the damaged impeller would be required to try and determine the precise cause of failure. Erosion on the compressor stage impeller was most likely produced by the impact of moisture droplets or foreign particles. The function of the compressor is outlined, together with a description of the associated major components. The history of the unit is described from the design stage, through installation, commissioning and operation, to the time of failure. Details of the damage to the machine are recorded. Modifications to the system are recommended, in order to minimize the risk of similar damage occurring when the booster compressor is re-commissioned.

20261 (DOE/MC/14129—1316) Fluidised-bed combustion: IEA Grimethorpe pressurized fluidised-bed test facility incident report - performance of the exhaust-gas heat exchangers. (NCB (IEA Grimethorpe) Ltd., Grimethorpe (UK)). Apr 1982. Contract AC21-80MC14129. 36p. NTIS, PC A03/MF A01. Order Number DE83006560.

The report presents the findings of an investigation into the main heat exchanger performace and the modifications now being carried out on the Grimethorne pressurized fluidized-bed combustor. The heat exchanger was designed as part of the steam/wate circuit to cool the exhaust gas entering with a temperature in the range of 750 to 950°C to approximately 300°C at the outlet. During hot commissioning, it was noted that the gas outlet temperature from the heat exchanger was appreciably above design although the inlet temperature was substantially below design. An analysis of the calculated heat transfer coefficients derived from several hot commissioning runs for the tube banks within the exchanger, showed them to be more than 50% below the design values. Inspection of the exchanger revealed the tubes to be covered with dust deposits, which acted as insulation and accounted for the reduction in performance, apart from the difference in design and actual inlet conditions. The report provides a description of the heat exchanger in terms of its function and design. Operational aspects up to the completion of Test Series 1 are outlined, and details are given of the modifications taht are to be carried out prior to Test Series 2. A brief outline of the auxiliary heat exchanger and its performance is included.

20262 (DOE/MC/14129—1317) Fluidised-bed combustion: high-pressure combustor at Leatherhead, Test 5 - results. (National Coal Board, Leatherhead (UK). Coal Utilization Research Lab.). Nov 1982. Contract AC21-80MC14129. 68p. NTIS, PC A04/MF A01. Order Number DE83006385.

A fluidised bed combustor was built to investigate the effect of pressure (up to 20 atm) on combustion efficiency, sulphur retention, NO/sub x/ emission, heat transfer and elutriation. This report presents results from Test 5 which was carried out, burnig Pittsburgh No. 8 coal and Plum Run (dolomite) sorbent. The major change to the combustor compared with Test 4 was the use of a different tube geometry in an attempt to reduce the temperature drop through the tube bank was 140°F, very similar to that in Test 4. Combustion efficiency was 99% at 16 atm and 98 1/2% at 10 atm. Sulphur retention was 74 1/2% at 16 atm when the Ca/S ratio was 1.15 and 87% at 10 atm when the Ca/S ratio was 1.4. These low retentions and Ca/S ratios were the result of an unexpectedly high sulphur content of the coal, which varied between 5 and 7%. As a result of the high SO_2 emissions, SO_3 concentrations in the exhaust gas were high, typically 40 to 80 vppm, but rising to c. 300 vpm when the dolomite feed failed and SO_2 emmisions were in the range 1000 to 1500 vppm. Much more data are required before all the factors affecting SO_3 formation can be evaluated, but it is apparent that high SO_2 emission must be avoided when the pressure is high. NO/sub x/ emissions were 0.30 lb/10^6 Btu at 16 atm/65% excess air and 0.27lb/10^6 Btu at 10 atm/27% excess air-values which are consistent with earlier results.

20263 (DOE/MC/14129—1358) Fluidised-bed combustion: high-pressure combustor at Leatherhead, Test 6 - results. (National Coal Board, Leatherhead (UK). Coal Utilization Research Lab.). Dec 1982. Contract AC21-80MC14129. 61p. NTIS, PC A04/MF A01. Order Number DE83006380.

A fluidised bed combustor was built to investigate the effect of pressure (up to 20 atm) on combustion efficiency, sulphur retention, NO/sub x/ emission, heat transfer and elutriation. This report presents results from Test 6 which was carried out to assess te effect on temperature distribution of changing the tube bank geometry. Combustion efficiency was greater than 99% at 16 atm pressure (highest efficiency occuring at the higher bed temperature) and 98 1/2 to 99% at 10 atm pressure. Sulphur retention was about 93% when the Ca/S ratio was approximately 2.0 at both 16 and 10 atm pressure. There was a slight improvement when the bed temperature was increased. NO/sub x/ emissions were 0.33 lb/10^6 Btu at 16 atm pressure and 1560°F bed temperature, decreasing to 0.23 lb/10^6 Btu at the lower excess air when operating at 10 atm. Alklai vapour measurements indicated concentrations in the exhaust (at a temperature in the range 1500 to 1570°F) was 0.02 wppm Na and 0.03 wppm K. Gas sample traverses were made at two levels in the bed at most of the operating conditions. The main results from this test were compared with those from the earlier tests.

20264 (DOE/MC/19332—1319) Atmospheric fluidized-bed combustor design whose performance will significantly exceed conventional FBC operation performance. Final report. Hsiao, K.H.; Lin, Y.Y.; Guglietta, G.W.; Cares, W.R.; Fraley, L.D.; Schreiner, W.C.; Schlossman, M.; Solbakken, A. (Kellogg (M.W.) Co., Houston, TX (USA)). Dec 1982. Contract AC21-82MC19332. 228p. NTIS, PC A11/MF A01. Order Number DE83005062.

It is the goal of this project to bring forth a bench-scale design and test program to establish the merits of the circulating bed concept of atmospheric fluidized bed combustors (AFBC) and to show what the process development unit elements might be. The circulating fluid dynamics were modeled. From such a model the physical dimensions of a test system and the matrix for a test program can be established which will allow determination of parameters for scale-up evaluation of effectiveness and cost. This report presents an analysis of circulating bed boiler design methodology, alternative bench-scale designs for two coal feed levels (20 lbs/h and 80 lbs/h), including costs, and a test program. It is shown that the circulating bed concept has great merit for meeting DOE's advanced AFBC combustor criteria. A conceptual AFBC bench-scale design has been developed for an innovative AFBC system, specifically, a circulating bed boiler (CBB) for which two geometrically-similar designs, differing only in size, are presented.

20265 (DOE/PC/30214—T5) Heat transfer to tubes in freeboard space of fluidized-bed combustors. Progress report, August 1, 1982-February 1, 1983. Chen, J.C.; Tuzla, K.; Biyikli, S. (Lehigh Univ., Bethlehem, PA (USA). Dept. of Mechanical Engineering and Mechanics). Feb 1983. Contract FG22-80PC30214. 9p. NTIS, PC A02/MF A01. Order Number DE83006386.

Progress in experimental studies of the heat transfer characteristics of tubes located in the freeboard region of fluidized beds is reported. Tests will be performed in room temperature and high temperature (300 to 750°C) beds with various size bed particles and fluidization air flow rates. Heat transfer coefficient results for a bed temperature of 750°C and various flows and particle sizes and for a fixed size of sand particles with a range of bed temperatures and air flow rates are plotted. (LCL)

20266 (EPRI-EA—2059) Assessment methodology for new cooling lakes. Volume 1. Methodology to assess multiple uses for new cooling lakes. Final report. Porcella, D.B.; Grieb, T.M.; Bowie, G.L.; Ginn, T.C.; Lorenzen, M.W. (Tetra Tech, Inc., Lafayette, CA (USA)). Feb 1983. 245p. NTIS, PC A11/MF A01. Order Number DE83901462.

The Assessment Methodology for New Cooling Lakes has been developed to evaluate multiple uses of new cooling lakes, with emphasis on the recreational use of fish. The report consists of three volumes. In Volume 1 the stepwise method is presented in steps for evaluating recreational use potential of a new cooling lake based on the fish community characteristics of biomass, species composition, and harvest. First, a statistical model was used to classify a cooling lake into one of four groups of lakes having unique fish community characteristics. These groups were defined using limnological and fisheries data from existing cooling and noncooling lakes. Second, detailed analysis of the fish community and water quality factors was performed with an ecosystem simulation model. These results are evaluated with accepted methods for determining recreational demand and use projected with respect to nearby population centers. Finally, specific techniques for managing fish and wildlife habitat associated with cooling lakes are presented.

20267 (EPRI-EM—2861) Evaluation of superconducting magnetic energy storage systems. Final report. Lee, S.T.; Albert, R.S.; Imamura, D.T. (Energy Management Associates, Inc., Santa Clara, CA (USA)). Feb 1983. 85p. NTIS, PC A05/MF A01. Order Number DE83901465.

The study objective was to estimate the breakeven capital cost of Superconducting Magnetic Energy Storage (SMES) and its highest possible value. The results will be compared by EPRI to the capital cost of SMES being estimated by Bechtel in a related study. The best and most reasonable estimate of the SMES breakeven capital cost is 1080 $/kW in 1981 dollars. The highest possible value for an ideal SMES with perfect availability, zero refrigeration load and 100% incremental cycle efficiency is 1570 $/kW when installed in a utility approximately one-third of the US in size. Two methods of analysis are used. A single-year analysis that assigns an energy credit and a capacity credit to SMES provides the method for parametric and sensitivity analyses. A thirty-year life cycle analysis comparing SMES to a coal-fired generation alternative recognizes fuel cost escalation effects. The value of SMES to each of the six EPRI Regional Systems is computed. In comparison with pumped storage, SMES is worth 14% more to a utility.

20268 (EPRI-TI—2800-SR) EPRI Research and Development Projects. (Electric Power Research Inst., Palo Alto, CA (USA)). Dec 1982. 268p. NTIS, PC A12/MF A01. Order Number DE83901580.

This report lists all EPRI research projects and organizes them according to technical division, department, and program. For recently authorized projects and for ongoing projects, the research objectives are described, contractors are identifed, and reports are listed.

20269 (MTI—11290-1) Technology Demonstrator Engine (TDE). Period test report, August 1979-May 1981. Moynihan, T.; Rauch, J. (Mechanical Technology, Inc., Albany, NY (USA)). 1981. Contract AC02-76ET11290. 151p. NTIS, PC A08/MF A01. Order Number DE83002272.

This report documents the test results of a Free-Piston Stirling Engine (FPSE) linear alternator power conversion system. Testing of this system began in August 1979, and has continued through May 1981. The aim of the overall program was to develop a 1 kW(e) fossil fuel stationary power system. The design was completed in 1978, fabrication was completed in April 1979. Detailed results are presented for tests involving three different external heat-input systems: (1) the copper-block interface heating with the internally finned dome head; (2) the revised electrical resistance tubular heater head; and (3) the natural-gas-fired combustor system. A complete geometric description and performance prediction for Configurations 3 are given.

20270 (NASA-CR—168942) Study of reactor brayton power systems for nuclear electric spacecraft. (AiResearch Mfg. Co., Phoenix, AZ (USA); Jet Propulsion Lab., Pasadena, CA (USA)). Sep 1979. 169p. NTIS, PC A08/MF A01.

Prepared for JPL, Pasadena, Calif. Original contains color illustrations.

The feasibility of using Brayton power systems for nuclear electric spacecraft was investigated. The primary performance parameters of systems mass and radiator area were determined for systems from 100 to 1000 kW sub e. Mathematical models of all system components were used to determine masses and volumes. Two completely independent systems provide propulsion power so that no single-point failure can jeopardize a mission. The waste heat radiators utilize armored heat pipes to limit meteorite puncture. The armor thickness was statistically determined to achieve the required probability of survival. A 400 kW sub e reference system received primary attention as required by the contract. The components of this system were defined and a conceptual layout was developed with encouraging results. An arrangement with redundant Brayton power systems having a 1500 K (2240 F) turbine inlet temperature was shown to be compatible with the dimensions of the space shuttle orbiter payload bay.

20271 (NP—3900020) Load flow optimization in an electrical energy network by means of a searching technique with random numbers. Fuchs, F. (Stuttgart Univ. (Germany, F.R.)). 11 Jun 1980. 110p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83900020.

Thesis.

The need for an optimal energy supply demands the solution of a nonlinear optimization problem in which a large number of secondary conditions have to be considered. In this work a searching technique is developped that is using random numbers. Within a given range the control variables are altered stochastically. Is this yielding an improvement with respect to the target function, the new values of the control variables are used as the starting values for the next stochastic variations. The influences of the size of the sampling region, the number of control variables on the probability of a hit is investigated. The probability of a hit that is observed during the optimizing calculation is used for an optimal measuring of the sample region. Comparative calculations with other searching methods show that the stragety developped here is very powerful and is very simple structured. In contrary to the gradient technique, solely a target function is needed without its derivations, that does not have to be continuous or differentiable.

20272 (NP—3900021) Using parallel-computer systems to evaluate the dynamical protection of power networks. Mansour, W.M. (Technische Univ. Braunschweig (Germany, F.R.). Fakultaet fuer Maschinenbau und Elektrotechnik). 5 Dec 1979. 155p. (In German). NTIS (US Sales Only), PC A08/MF A01. Order Number DE83900021.

Thesis.

In this work the possibility is investigated to use a system of parallel comptuers in the performance of dynamic safety calculations of energy supply networks by means of known mathematical models for synchrotron generators. The investigations were conducted by using a computer of type SIEMENS 305. A model for the calculations consisting of 4 and 9 nodes shows that in modelling the machines according to the given machine model the computation time can be quite reduced, compared to usual computational techniques, by using the non-iterative computational technique and computation by means of a system of parallel computers, that is presented in this work.

20273 **(NUREG/CR—2518) Thermodynamic properties of water for computer simulation of power plants.** Kuck, I.Z. (Arizona Univ., Tucson (USA). Dept. of Nuclear Engineering). May 1982. 67p. NTIS, PC A04/MF A01.

Steam property evaluations may represent a significant portion of the computing time necessary for power system simulations. The iterative nature of the solutions for heat transfer and kinetic equations often requires thousands of steam property evaluations during the execution of a single program. Considerable savings may be realized by simplification of property evaluations. Empirical equations have been obtained for the thermodynamic properties of water in the region of interest. To maintain thermodynamic consistency, the compressibility factor Z, in terms of pressure and temperature, was obtained by curve fitting, and the enthalpy, entropy, and internal energy were derived by standard relationships. Formulations for heat capacity, saturation temperature as a function of saturation pressure, the specific volume of saturated water as a function of saturation pressure, and specific volume of saturated water as a function of the saturation temperature were determined by curve fitting of independent equations. Derivatives were obtained by differentiation of the appropriate formulations. Evaporator and superheater components of a liquid metal fast breeder reactor power plant simulator were chosen as test cases for the empirical representations. Results obtained using the empirical equations were comparable to those obtained using tabular values and required 24% less computing time.

20274 **(PB—82-217639) A european atomic energy Community Report. Part I: comparative risks from electricity generating systems. Part II: risk assessment of energy systems. Final report.** Bainbridge, G.R. (Commission of the European Communities, Luxembourg). [nd]. 126p. NTIS, PC AE06/MF E06.

An investigation has been carried out into the feasibility of making a meaningful comparison of the hazards associated with the generation of electricity from coal, oil and nuclear power. The existing literature on the risks associated with electricity generation is reviewed, and abstracts are provided of eight reports of special relevance. The recommended basis of comparison is the number of accidents involving death or injury and the number of delayed deaths from exposure to toxic substances per gigawatt year of electricity generated. Risk assessment should take into account the entire fuel cycle from the extraction of the fuel, its transportation to the power station, the construction of the power station and its machinery, to its actual operation, as well as dangers to the work force and members of the public, caused by explosions and the release of effluents, and finally, the disposal of waste.

20275 **(PB—82-229725) Evaluation of models for predicting evaporative water loss in cooling impoundments. Final report.** Helfrich, K.R.; Adams, E.E.; Godbey, A.L.; Harleman, D.R.F. (Massachusetts Inst. of Tech., Cambridge (USA). Energy Lab.). Mar 1982. 164p. NTIS, PC A08/MF A01.

Cooling impoundments can offer a number of advantages over cooling towers for condenser water cooling at steam electric power plants. However, a major disadvantage of cooling ponds is a lack of confidence in the ability to predict various aspects of their hydrothermal performance and consumptive water use. This report focuses on evaporation, which is related to both pond performance (temperature) and consumptive water use. A discussion of evaporation equations from both a theoretical and an empirical basis is presented. Several empirical evaporation equations falling into three basic categories-Dalton Law, Modified Dalton Law, and Stability Dependent - were compared to determine accuracy and confidence limits for evaporation from heated water bodies. Comparisons were carried out using MIT's dynamic cooling pond model MITEMP to evaluate the energy budget for six weeks of comprehensive meteorological and water temperature data taken at Dresden Cooling Pond in Illinois.

20276 **(PB—82-230905) Fluidized-bed combustion technology overview. Final report Dec 79-Dec 80.** Dowdy, T.E.; Klett, M.G.; Rubow, L.N.; Seth, R.G.; Milliken, J.O. (GCA Corp., Bedford, MA (USA). GCA Technology Div.). Apr 1981. 155p. NTIS, PC A08/MF A01.

The report reviews fluidized-bed combustion (FBC) technology development through 1979, specifying the work of governmental agencies and individual investigators, highlighting key technical issues, and documenting the current degree of FBC commercialization.

20277 **(PB—82-232372) An assessment of central-station congeneration systems for industrial complexes. Final report Mar 76-Mar 78.** Hilsen, N.B.; Fletcher, G.R.; Kelley, D.L.; Tiller, J.S.; Day, S.W. (Georgia Inst. of Tech., Atlanta (USA). Engineering Experiment Station). Apr 1982. 205p. NTIS, PC A10/MF A01.

This report assesses the potential for cogeneration system development based on an analysis of the economic, environmental, energy efficiency and social aspects of such systems. The cogeneration system is an application of the principle of cogeneration in which utility-sized power plants supply both electrical and steam needs to one or more nearby industries. Such a system can result in increased energy efficiency reduced pollutants, and reduced overall cost. A number of methodological approaches, including environmental impact analysis, were used to investigate the broad scope of issues relevant to cogeneration system development. As the study considered the subject from a general, comprehensive, planning-level perspective, the quantitative results cannot be applied to other sites. However, trends associated with the impacts of cogeneration development are identified, and methodologies which are applicable to cogeneration systems in general are employed.

20278 **(PB—82-237025) Ammonium sulfate and bisulfate formation in air preheaters. Final report Oct 80-Oct 81.** Burke, J.M.; Johnson, K.L. (Radian Corp., Austin, TX (USA)). Apr 1982. 270p. NTIS, PC A12/MF A01.

The overall goal of this study was to investigate the problems which result from deposition of ammonium sulfates in an air preheater. More specifically, the study had three major objectives. The first was to determine the conditions under which ammonium sulfates are expected to form. The second objective was to identify the factors which influence the formation of ammonium sulfates. The third objective was to identify and evaluate methods for preventing ammonium sulfate deposition/corrosion in air preheaters.

20279 **(PB—82-241605) Microprocessor-controlled ion selective electrode determination of total chlorine. Final report.** Howe, L.H.; Hadley, R.E.; Fischer, G.A. (Tennessee Valley Authority, Chattanooga (USA). Office of Natural Resources). Mar 1982. 200p. NTIS, PC A09/MF A01.

A microprocessor-controlled ion selective electrode (MC) method was evaluated and compared to the forward amperometric titration (AT) method for determining total chlorine in condenser cooling river water from coal-burning electric plants. The effective range for quantification by the MC method is from the minimum detection limit of 6.5 micrograms/l chlorine for unspiked condenser water and 13.3 micrograms/l chlorine for spiked condenser water to 100 micrograms/l chlorine. Interferences by zinc(II), copper(II), iron(III), arsenic(III), and manganese(VII) are discussed. The pH, chromium(VI), mercury(II), bromide, and arsenic(V) do not interfere with measurement of total chlorine. For both unspiked and spiked condenser water, the overall pooled standard deviation and overall mean percentage relative standard deviation over concentrations of 20-200 micrograms/l chlorine are lower for the MC method than for the AT method. Standard deviations are discussed for the MC method over concentrations of 2-20 micrograms/l chlorine.

20280 **(PB—82-256694) Feasibility of financial incentives to reuse low quality waters in the Colorado River Basin.** Milliken, J.G.; Lohman, L.C.; Howe, C.W. (Denver Research Inst., CO (USA)). Aug 1981. 94p. NTIS, PC A05/MF A01.

The cost-effectiveness of selected financial incentives for encouraging reuse of low quality/saline water collected by the U.S.

Bureau of Reclamation (USBR) system for electric power plant cooling is analyzed. Penalty costs to water users presently using saline waters for agricultural/domestic purposes and the potential economic benefits in salinity reduction are identified. Non-quantifiable salinity control benefits were identified as well, in terms of existing/potential beneficial water uses in the 7 Colorado River basin States and general amenity benefits. Reuse of saline water by an electric power utility could be a viable and cost-effective method of salinity control.

20281 (PB—83-114942) **Assessing safety in fossil fueled electric power generating plants. Final report.** Frezza, A.; Decker, D.A. (Bendix Corp., Cocoa Beach, FL (USA). Launch Support Div.). Sep 1978. 202p. NTIS, PC A10/MF A01.

The safety record of central electric power generating facilities utilizing fossil fuels as a primary energy source was evaluated. Records of 30 recent incidents which occurred during normal operation and maintenance and involving a safety problem were analyzed to determine their extent and magnitude. The commonality of occurrences and cause was also interpreted. The number of fatalities and injuries were minimal but property losses were high. There was no common cause or agent associated with incidents which involved fatalities or hospitalization. The author concludes that improved fire protection, loss prevention, life and personnel safety programs would significantly reduce the impact of safety related incidents.

20282 (TVA—3900545) **Availability and reliability improvement program.** (Tennessee Valley Authority, Chattanooga (USA). Div. of Power Production). 27 Jun 1978. 53p. NTIS, PC A04/MF A01.

The goal of TVA's Availability Improvement Program for its fossil-fueled power plants is to increase plant availability from 79 to 83%, to reduce the forced outage rate from 10 to 7%, and to reduce the equivalent outage rate related to forced deratings from 6 to 2%. As background for this program historical data on plant availabilities, trends toward improved availability, factors which contribute to current reliability, and ongoing programs to improve fossil-fueled plant reliability are discussed. (LCL)

20283 (TVA—3900546) **Fossil steam reliability & availability. Quarterly status report.** (Tennessee Valley Authority, Chattanooga (USA). Div. of Fossil and Hydro Power). 1981. 155p. NTIS, PC A08/MF A01. Order Number DE83900546.

Tabulated and graphic data are compiled on availability, reliability, and forced outages of fossil-fueled TVA power plants. (LCL)

20284 **Overvoltage protector using varistor initiated arc.** Brainard, J.P. (to Dept. of Energy). US Patent 4,365,282. 21 Dec 1982. Filed date 14 Feb 1980. vp.

PAT-APPL-121566.

Coaxial conductors are protected against electrical overvoltage by at least one element of non-electroded varistor material that adjoins each other varistor element and conductor with which it contacts. With this construction, overvoltage current initiated through the varistor material arcs at the point contacts between varistor elements and, as the current increases, the arcs increase until they become a continuous arc between conductors, bypassing the varistor material.

20285 **Use of steam coal in power stations.** New York, NY; United Nations (1982). 14p. .

The use of coal for power generation is discussed. The fall in oil consumption is considered likely to continue. Nuclear power will not realize its full potential whilst the problems of risk, public acceptance, financing, and construction delays remain. It is suggested that coal will continue to play a major role in electricity generation, though the current excess generating capacities of many countries may prove a severe constraint. Data on the use of steam coal in power stations is provided for most European countries, the U.S.A. and U.S.S.R.

20286 **(ORNL-tr—4958) Is the trend towards large power units in power-plant construction justified.** Buch, A. Translated from *Energie* ; **29**: No. 7, 198-204(1977). Contract W-7405-ENG-26. 24p. NTIS, PC A02/MF A01. Order Number DE83006739.

The numerous factors which influence the price and economics of power plants are examined in an effort to determine what power plant size is the cheapest to build and operate. These factors include costs for: licensing; environmental protection; site selection and development; design, construction, operation; and maintenance. After comparing the advantages and disadvantages of large units it is concluded that the purely thermal and financial comparison of profitability, based on the investigated power plant units themselves, reveals that the large unit capacities are 11% more advantageous economically than the smaller units up to a power division of 1:4. Dual-fuel capacity would not affect this conclusion, but the inclusion of cogeneration capability and of conditions at specific sites might argue in favor of smaller plants. (LCL)

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REFER ALSO TO CITATION(S) 19434, 19537, 19575, 19578, 19582, 19583, 19585, 19586, 19587, 19588, 19589, 19606, 19625, 20246, 20256, 20262, 20263, 21699, 21700, 21704, 21708, 21709, 21710, 21756, 21848, 21855, 21986, 22013

20287 (CONF-800878—, pp 278-286) **Current status of dry flue gas desulfurization systems.** Kelly, M.E.; Dickerman, J.C. (Radian Corp., Durham, NC). 1980. Univ. of Pittsburgh, Dept. of Chemical and Petroleum Engineering, Pittsburgh, PA 15261.

From 7. annual international conference on coal gasification, liquefaction, and conversion to electricity; Pittsburgh, PA, USA (5 Aug 1980).

One of the major driving forces for development of dry SO_2 removal systems is the opportunity for reduction in both capital and operating costs. Although costs are quite site specific, the three types of dry FGD technologies considered here offer several potential possibilities for cost savings. This is due to the reduction in equipment and operation and maintenance requirements relative to conventional wet lime/limestone systems, especially in utility applications. The minimal equipment and operating requirements for dry injection systems make the process economically attractive as far as capital costs are concerned, but high sorbent requirements and uncertainties in sorbent availability and cost are slowing further development of the technology on a commercial scale. The application of spray dryer technology to higher sulfur coals may be subject more to economic rather than technological limitations. Higher stoichiometries are required for higher sulfur applications. Consequently, the reagent cost differential between lime and limestone may alone make a spray dryer based system uneconomical. Major restraints to the development of dry injection technology have been uncertainty in sorbent (nahcolite) availability, waste-disposal problems associated with sodium based salts and the relatively high flue gas temperatures required to achieve high SO_2 removals with calcium based sorbents. To date, only preliminary data exist for the SO_2 control effectiveness and operation of boilers firing either coal/limestone pellets or a pulverized coal/limestone fuel mixture.

20288 **(IIUG/dp—81-11) STEAG coal-fired power plant at Voerde or changing German clean air policy.** Knoedgen, G. (Wissenschaftszentrum, Berlin (Germany, F.R.). Internationales Inst. fuer Umwelt und Gesellschaft). 1981. 72p. NTIS (US Sales Only), PC A04/MF A01. Order Number DE83750191.

In discussions on economic policy in the Federal Republic of Germany, frequent complaints are herd on billions of, invested marks being blocked by too much bureaucracy in licensing procedures, public protest and lengthy laws. This problem is the context in which the parent case report on the fossil fuel power plant at Voerde - probably the most well-known example in the Federal Republic of Germany for temporarily blocked investments in the power plant construction sector - must be seen. It seems to be particularly suited to elucidate the decision process of an undertaking that produces for a monopolized market and is associated with state institutions by capital holdings and common aims in energy policy.

The stubborn opposition of in principle, one citizen and some lawsuits in his favour prompted several law initiatives. In the authors' opinion, analysis of the case Voerde shows that attempts to check the blocking of investments by changing the licensing procedure can be dangerous. As participation of the public in licensing procedures and private claims to file lawsuits are practised. As democratic rights, the chances are that by retrenching such rights resistance is strengthened and the opposite effect obtained.

20289 **(NUREG/CR—2443) Manual for using energy analysis for plant siting.** Odum, H.T.; Lavine, M.J.; Wang, F.C.; Miller, M.A.; Alexander, J.F. Jr.; Butler, T. (Florida Univ., Gainesville (USA). Center for Wetlands). Feb 1983. 242p. NTIS, PC A11/MF A01 - GPO $7.50. Order Number DE83901456.

This is an instructional manual for choosing among possible sites for power plants by selecting the one with the least diversion of resources of the environment and of the economy. For each alternative site, changes of embodied energy in flows and storages are estimated in solar equivalent Calories. Then a dollar equivalent is estimated from the ratio of total solar equivalent flows to gross national product. Sample calculations are provided for LaSalle power plant west of Chicago considering alternatives of cooling reservoirs, cooling from a natural water body, and cooling towers. In order to facilitate calculation, an appendix provides procedures and data for evaluating embodied energy of the environment.

20290 **(PB—82-219353) Power plant site evaluation - Dickerson site. Interim report.** Eberhart, R.C. (Johns Hopkins Univ., Laurel, MD (USA). Applied Physics Lab.). Apr 1973. 249p. NTIS, PC A11/MF A01.

In accordance with Maryland's power plant siting legislation, as proposed by PEPCO, the expansion of the Dickerson plant will consist of two 850 MWe units fired by coal containing approximately 2% sulfur by weight and cooled by natural draft cooling towers. The cooling water is used for make-up Potomac River water drawn from the cooling water discharge canal of the existing Dickerson power plant and returned to the same canal. Possible environmental effects associated with fossil-fuel-fired plants such as the one proposed for Dickerson result from the impact of gases from the furnace and of a combination of waste-heat-related effluents on their surroundings. The most troublesome furnace products are sulfur dioxide, oxides of nitrogen, and particulate matter.

20291 **(PB—82-219361) Power plant site evaluation - Brandon Shores site. Interim report.** (Johns Hopkins Univ., Laurel, MD (USA). Applied Physics Lab.). 15 Nov 1972. 375p. NTIS, PC A16/MF A01.

This report examines potential environmental and ecological effects likely to result from the construction and operation of a power plant at Brandon Shores. The plant proposed by the Baltimore Gas and Electric Company is to consist of two 600 MWe units fired by residual oil and cooled by parallel path wet-dry cooling towers using Patapsco River water drawn from the current discharge canal of the adjacent H.A. Wagner power plant. Studies were conducted to characterize existing environmental conditions and to predict impacts expected from the new facility. Included in the assessment of potential impacts are (1) impacts of cooling system effluents on marine, land, and air environments; (2) effects of plant combustion effluents; and (3) pollant dispersion processes. Also described are compositions and concentrations of cooling tower chemicals and physical and chemical data from the Patapsco River Estuary, Maryland.

20292 **(PB—82-224726) Energy siting in Utah: a programming model.** Synder, D.L.; Keith, J.E.; Glover, T.F.; Wooldridge, G.L. (Utah State Univ., Logan (USA). Utah Water Research Lab.). Jun 1981. 61p. NTIS, PC A04/MF A01.

A study was conducted to examine the economically efficient allocation of resources between existing and proposed production entities, given resource and environmental constraints. The necessary conditions for an optimal input and output allocation were determined for a region constrained by resource availabilities and/or policy constraints, using a conceptual model of a multiple-product firm. A linear programming model was developed to determine optimal water allocation between agricultural and coal-fired power plants and the trade-offs which could occur if electrical generation were increased. Other potential trade-offs examined included coal source restrictions and air quality regulations. Also included were coal mining, transportation costs, and pollutant (SO2, nitrogen oxides, particulates) emission rates on a coal and plant basis.

20293 **(PB—82-227265) Combustion modification Nox controls for utility boilers. Volume I: tangential coal-fired unit field test. Final report Jul 78-Jul 79.** Higginbotham, E.B.; Goldberg, P.M. (Acurex Corp., Mountain View, CA (USA). Energy and Environmental Div.). Jul 1981. 158p. NTIS, PC A08/MF A01.

The report gives results of an environmental assessment field testing program on a tangential-coal-fired utility boiler. The aim of the program was to measure multimedia emissions changes as a result of applying combustion modification NOx control. Emissions of trace elements, organic materials, sulfur species, SO2, NOx, CO, and particulate matter were measured. These emissions were compared under normal and low-NOx operating conditions. Source operating data were also analyzed so that changes in operating parameters and efficiency could be assessed. The test were conducted on TVA's Kingston Steam Plant, Unit 6, a 180-MW, pulverized-coal, tangentially fired, electric utility boiler with a rated capacity of 582 Mg/hr (1.28 million lb/hr) steam. Burners-out-of-service and biased-burner firing were used for NOx control.

20294 **(PB—82-227273) Combustion modification Nox controls for utility boilers. volume II: pulverized-coal wall-fired unit field test. Final report Jul 78-Jul 79.** Sawyer, J.W.; Higginbotham, E.B. (Acurex Corp., Mountain View, CA (USA). Energy and Environmental Div.). Jul 1981. 187p. NTIS, PC A09/MF A01.

The report gives methods and results of an environmental assessment test program at Gulf Power's Crist Power Plant, Unit 7. The aim of the program was to measure multimedia emissions changes as a result of applying NOx controls. Emissions of trace elements, organic materials, sulfur species, particulate matter, CO2, O2, NOx, and CO were measured. These emissions, under normal and controlled (for NOx) operating conditions were compared. Source operating data were also analyzed so that changes in operating parameters and efficiency could be assessed.

20295 **(PB—82-227281) Combustion modification Nox controls for utility boilers. Volume III: residual oil wall-fired unit field test. Final report Jul 78-Jul 79.** Sawyer, J.W.; Higginbotham, E.B. (Acurex Corp., Mountain View, CA (USA). Energy and Environmental Div.). Jul 1981. 144p. NTIS, PC A07/MF A01.

The report gives methods and results of an environmental assessment test program at Pacific Gas and Electric's Moss Landing Power Plant, Unit 6. The aim of the program was to measure changes in emissions as a result of applying NOx controls. Emissions of trace elements, organic materials, sulfur species, particulate matter, CO_2, O_2, NOx, and CO were measured. These emissions, under as-designed and controlled (for NOx) operating conditions, were compared. Source operating data were also analyzed so that changes in operating parameters and efficiency could be assessed. Two degrees of NOx control were tested: the highest level, corresponding to present boiler operation, consisted of burners-out-of-service and flue gas recirculation (FGR) to the windbox; and the other, representing an intermediate degree of control, consisted of only FGR to the windbox.

20296 **(PB—82-230616) Harrington Station Unit 2 fabric filter system special testing report. Final report Dec 78-Jul 81.** Ladd, K.; Plunk, O.; Thurman, S.; Pinson, L.; Fajardo, L. (Southwestern Public Service Co., Amarillo, TX (USA)). Oct 1981. 153p. NTIS, PC A08/MF A01.

The report gives results of a special test program to determine mass emissions of particulate, SO_2, and NOx from a large utility baghouse controlling emissions from a boiler firing low-sulfur Western coal. The tests verified that NOx emissions, measured by EPA Method 7, were not significantly affected by the baghouse. Emissions of SO_2 measured consistently below the New Source

Performance Standard of 1.2 lb/million Btu at a level of about 0.8 lb/million Btu. Particulate tests indicated an average emission rate of 0.028 lb/million Btu. Overall test results indicate that Southwestern's Harrington Station, using low-sulfur and low-ash Western coal, can operate consistently within all applicable mass emission rates while using a fabric filter for air quality control.

20297 (PB—82-231150) EPA utility FGD survey: July-September 1981. Quarterly report. Smith, M.; Melia, M.; Gregory, N. (PEDCo-Environmental, Inc., Cincinnati, OH (USA)). Dec 1981. 365p. NTIS, PC A16/MF A01.

The report is the last of three supplements updating the October-December 1980 report (EPA-600/7-81-012a and -012b) and should be used in conjunction with it. The report, generated by a computerized data base system, surveys operational and planned domestic utility flue gas desulfurization (FGD) systems. It summarizes information contributed by the utility industry, process suppliers, regulatory agencies, and consulting engineering firms. It alphabetically tabulates domestic FGD systems by development status (operational, under construction, or in planning stages), utility company, process supplier, process, and waste disposal practice. It gives data on boiler design, fuel characteristics, FGD system design, and actual performance. It includes unit by unit dependability parameters and discusses problems and solutions associated with the boilers and FGD systems. Process flow diagrams and FGD systems economic data are appended.

20298 (PB—82-231267) Dual alkali acceptance test at Louisville Gas and Electric Company; Volume I. Acceptance test and appendices A-C. Final report Apr 79-Jul 80. Watson, D.; Martin, T.; Donnelly, J.; Zoueshtiagh, N. (Bechtel Corp., San Francisco, CA (USA)). Sep 1981. 109p. NTIS, PC A06/MF A01.

The report gives results of the completed acceptance test series run on the dual alkali system serving Louisville Gas and Electric Company's Cane Run Unit 6 boiler. This volume contains the process description and a discussion of the test results, operating history, and performance. Appendices A-C contain acceptance test daily summaries, monthly performance parameters, and Kenvirons' acceptance test reduced data.

20299 (PB—82-231275) Dual alkali acceptance test at Louisville Gas and Electric Company; Volume II. Appendices D-F. Final report Apr 79-Jul 80. Watson, D.; Martin, T.; Donnelly, J.; Zoueshtiagh, N. (Bechtel Corp., San Francisco, CA (USA)). Sep 1981. 407p. NTIS, PC A18/MF A01.

The report gives results of the completed acceptance test series run on the dual alkali system serving Louisville Gas and Electric Company's Cane Run Unit 6 boiler. This volume (Volume II) contains a discussion of the analytical and sampling methods, quality assurance, and the raw data gathered by Kenvirons.

20300 (PB—82-231283) Dual alkali acceptance test at Louisville Gas and Electric Company; Volume III. Appendices G-J. Final report Apr 79-Jul 80. Watson, D.; Martin, T.; Donnelly, J.; Zoueshtiagh, N. (Bechtel Corp., San Francisco, CA (USA)). Sep 1981. 375p. NTIS, PC A16/MF A01.

The report gives results of the completed acceptance test series run on the dual alkali system serving Louisville Gas and Electric Company's Cane Run Unit 6 boiler. This volume (Volume III) contains raw data gathered by Kenvirons, calculations, and computerized reduced data submitted to Bechtel by Kenvirons.

20301 (PB—82-234618) Sampling for high-molecular-weight organic compounds in power plant stack gases. Final report. Dickson, W.R.; Miller, H.C.; Barrett, W.J. (Southern Research Inst., Birmingham, AL (USA)). May 1982. 50p. NTIS, PC A03/MF A01.

The results of laboratory and field investigations of experimental sampling systems intended to collect high-molecular-weight organic compounds from flue gases in coal-fired power plants are presented. The most promising sampling device was a solid sorbent cartridge inserted directly into the flue gas stream and cooled to a temperature just above the dew point by a forced flow of external ambient air. Although certain sorbent materials were shown to be partially effective for the collection of vapors of polynuclear aromatic hydrocarbons at temperatures of 50 to 60C, no completely satisfactory sorbent was found. Ambersorb XE-340, a nonpolar carbonaceous sorbent, was the most satisfactory of several organic and inorganic sorbent materials tried, but its usefulness was limited by the presence of contaminants that could not be removed. The simplicity of the sampling system and the results obtained suggest that continuing efforts should be made to find a better sorbent material.

20302 (PB—82-237371) Studies of flue gas desulfurization at Louisville Gas and Electric's Paddy's Run Station: Volume I. Carbide and commercial lime testing. Final report Mar 75-Feb 1978. Hargrove, O.W. Jr; Behrens, G.P.; Corbett, W.E. (Radian Corp., Austin, TX (USA)). May 1982. 198p. NTIS, PC A09/MF A01.

The report gives results of tests to determine the technical factors accounting for the success of the flue gas desulfurization (FGD) system at Louisville Gas and Electric Co.'s Paddy's Run Unit 6. (Between its start-up in the Spring of 1973 and the Fall of 1976, the Unit 6 FGD system logged almost 4000 hours of operation without any major process or mechanical problem.) Test results indicate that carbide lime (a waste by-product of acetylene manufacture using calcium carbide), used at Unit 6, contains oxidation inhibitors that prevent gypsum scaling in the FGD scrubber. Commercial lime testing without these inhibitors resulted in gypsum scaling. However, adding magnesium (3000 ppm in the slurry liquor) reduced sulfite dissolution in the scrubber, thereby reducing sulfite oxidation and allowing scale-free operation. Increasing the chloride level increased sulfite oxidation; an increase in magnesium addition offset the effects of higher chloride levels. Lime systems can be operated successfully with low reaction tank residence times because of the rapid dissolution of lime. The size of the reaction tank and the lime addition point affect the crystal structure of the scrubber waste solids.

20303 (PB—82-237389) Studies of flue gas desulfurization at Lousiville Gas and Electric's Paddy's Run Station: Volume II. Review and analysis of commercial operations. Final report Mar 75-Feb 1978. Hargrove, O.W. Jr; Ottmers, D.M. Jr. (Radian Corp., Austin, TX (USA)). May 1982. 174p. NTIS, PC A08/MF A01.

The report gives results of tests to determine the technical factors accounting for the success of the flue gas desulfurization (FGD) system at Louisville Gas and Electric Co.'s Paddy's Run Unit 6. (Between its start-up in the Spring of 1973 and the Fall of 1976, the Unit 6 FGD system logged almost 4000 hours of operation without any major process or mechanical problem.) Test results indicate that carbide lime (a waste by-product of acetylene manufacture using calcium carbide), used at Unit 6, contains oxidation inhibitors that prevent gypsum scaling in the FGD scrubber. Commercial lime testing without these inhibitors resulted in gypsum scaling. However, adding magnesium (3000 ppm in the slurry liquor) reduced sulfite dissolution in the scrubber, thereby reducing sulfite oxidation and allowing scale-free operation. Increasing the chloride level increased sulfite oxidation; an increase in magnesium addition offset the effects of higher chloride levels. Lime systems can be operated successfully with low reaction tank residence times because of the rapid dissolution of lime. The size of the reaction tank and the lime addition point affect the crystal structure of the scrubber waste solids.

20304 (PB—82-240086) Impact of Nox selective catalytic reduction processes on flue gas cleaning systems. Final report Oct 80-Oct 81. Jones, G.D.; Glover, R.L.; Behrens, G.P.; Shirley, T.E. (Radian Corp., Austin, TX (USA)). Apr 1982. 103p. NTIS, PC A06/MF A01.

The report gives results of a study of the impact of the ammonia leaving a nitrogen oxide (NOx) selective catalytic reduction (SCR) process on downstream flue gas cleaning processes. (NOx emissions from electric utility boilers may be reduced 80-90% by the application of pollution control technology based on the SCR of NOx with ammonia; however, some unreacted ammonia may be emitted from the control system.) These processes include electrostatic precipitators (ESPs), baghouses, and flue gas desulfurization (FGD) systems. In normal operation, most ammonia leaving the SCR system will be removed, either as particulate salts by the particulate removal system or as free ammonia by the FGD system. Very little ammonia should be emitted at the stack. The operation of ESPs and FGD systems will, in most cases, be improved by the presence of ammonia in the flue gas. The effects of ammonia and ammonia salts on baghouse operation are not known. At normally expected emission levels, no adverse environmental impacts are projected; however, at high ammonia emission levels, the potential exists for problems with ammonia in the waste streams from fly ash and SO2 collection devices. Potential adverse environmental impacts exist in the ash and sludge ponds where collected ammonia may be concentrated and emitted as a gaseous pollutant.

20305 **(PB—82-249350) Environmental assessment of stationary source Nox control technologies. Final report Jun 76-Sep 79.** Waterland, L.R.; Lim, K.J.; Higginbotham, E.B.; Evans, R.M.; Mason, H.B. (Acurex Corp., Mountain View, CA (USA)). May 1982. 339p. NTIS, PC A15/MF A01.

The report summarizes results of a 3-year evaluation of combustion modification controls for emissions of NOx and other pollutants from stationary combustion sources. Results include field tests of gaseous, liquid, and solid effluents from seven stationary sources; estimates of environmental effects of using combustion modification control; evaluation of NOx control reduction effectiveness, capital and operating costs, and operational impact for several levels of control; projection of control technology needs to the year 2000 for several scenarios of energy growth and environmental regulations; and inventories of nationwide stationary source emissions for major pollutants and emission projections to the year 2000. Three utility boilers, two industrial boilers, a gas turbine, and a low-emission residential heating system were tested. The utility boiler tests on two coal-fired systems and one oil-fired boiler, showed NOx emission level reductions of 30-43% using various combustion modification techniques; however, the same tests showed that other emissions were essentially unchanged. Similarly, tests on the other types of equipment showed that modifications to reduce NOx left emissions of other species unchanged or lower. In some cases, where emissions were increased, the environmental effect was counter-balanced by the beneficial effects of NO reduction.

20306 **(PB—82-257650) Long-term benthic monitoring programs for the mesohaline Chesapeake Bay. Interim report.** Hiegel, M.H.; Fisher, K.; Johnson, G.F. (Martin Marietta Corp., Baltimore, MD (USA). Environmental Center). Apr 1982. 83p. NTIS, PC A05/MF A01.

This report presents a summary of data collected and an updated progress report for a long-term benthic study conducted to measure the long-term effects of power plant operations on benthic populations and to identify long-term trends and annual cycles in these populations. Benthic organisms and the physical/chemical characteristics of sediments and water were sampled between July 1981 and May 1982 in the mesohaline portion of the Chesapeake Bay and the Potomac estuary. The surveys were concentrated near the Morgantown and Calvert Cliffs, Maryland power plant. Salinities during 1981-1982 were high relative to long-term salinity records with the deviation from average salinities being larger in the Potomac than the mainstem of the Bay.

20307 **(PB—83-117804) EPA utility FGD survey, October-December 1981. Volume I. Categorical summaries of FGD systems. Volume II. Design and performance data for operational FGD system. Quarterly report.** Melia, M.T.; Bruck, N.G. (PEDCo-Environmental, Inc., Cincinnati, OH (USA)). Sep 1982. 1289p. NTIS, PC A99/MF E08.

The report is the first full compilation (not a supplement) since the October-December 1980 report (EPA-600/7-81-012a and -12b). Because the next three reports are to be supplements, this issue should be retained for reference throughout the year. The report, generated by a computerized data base system, presents a survey of operational and planned domestic utility flue gas desulfurization (FGD) systems. It summarizes information contributed by the utility industry, process suppliers, regulatory agencies, and consulting engineering firms. Domestic FGD systems are tabulated alphabetically by development status (operational, under construction, or in planning stages), utility company, process supplier, process, and waste disposal practice. It presents data on boiler design, FGD system design, fuel characteristics, and actual performance. Process flow diagrams and FGD system economic data are appended. Section 3 of the report, because of its length, appears in Volume II.

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REFER ALSO TO CITATION(S) 20268, 20824

20308 **(DOE/SF/00515—T2) Power-supply-operations group-training programs, ac/dc power systems and micellaneous information.** Harris, C.A. (Stanford Linear Accelerator Center, CA (USA)). 30 Jun 1978. Contract AC03-76SF00515. 68p. NTIS (US Sales Only). Order Number DE82014965.

This program introduces the technician to three phase a-c power and its relationship to rectifier power conversion systems. A brief introduction is given as to the engineering significance of various parameters such as, phase rotation, ac power relationships, harmonics, transformer voltage vectors, rectifier parameters, filters, water cooling, phase delayed triggers to SCR's, dielectric stress vs life and other related subjects. The significance of the details as they apply to various diagnostic problems that a technician may be called upon to solve is emphasized. Reference CAPE-2747.

20309 **(ORNL—5898) Advanced power-conversion concepts for HVDC transmission systems.** Jewell, W.T. (Oak Ridge National Lab., TN (USA)). Jan 1983. Contract W-7405-ENG-26. 33p. NTIS, PC A03/MF A01. Order Number DE83008141.

Increasing complexity of high-voltage direct current (HVDC) transmission systems places new demands on alternating current/direct current (ac/dc) power converters. The possibility of using advanced power conversion techniques, specifically force-commutated conversion, is discussed. Previous work on this concept and some studies and development of low-voltage advanced converters are reviewed, and recommendations are made for future work. Advanced converters have been successfully used to feed ac distribution systems at megawatt power levels, and results of previous studies of the use of such converters in HVDC systems have been favorable. However, these studies condidered only one type of advanced converter, and further work should consider the wide variety of available designs. Further work is justified by the increasing complexity of HVDC systems. Recommended further work includes computer simulation studies, a survey of the future availability of solid-state switching devices, a review of advanced converter designs, and finally, the actual design of an HVDC converter that uses advanced conversion concepts.

20310 **(ORNL/TM—8484) High-voltage-gradient zinc oxide varistors: fabrication and properties.** Lauf, R.J. (Oak Ridge National Lab., TN (USA)). Mar 1983. Contract W-7405-ENG-26. 22p. NTIS, PC A02/MF A01. Order Number DE83008137.

Zinc oxide varistors have many properties that make them attractive as surge arrestors or voltage limiters in high-voltage power transmission systems. The electrical characteristics are influenced by the ZnO grain size, and reducing the grain size would allow the entire device to be much smaller. The practical advantages of smaller arrestors are particularly important for underground transmission lines. Advanced ceramic processing techniques were used to fabricate ZnO varistors having grain sizes in the 3- to 4-μm range, compared to 7 to 13 μm in commercial devices. The fine-grained varistors exhibited high breakdown voltage gradients, compared to commercial materials. Processing steps included synthesis of highly active powders by sol-gel techniques and hot pressing in a reducing environment to achieve high density at temperatures below about 800°C. Heat treatment in air at temperatures up to 1000°C fully developed the nonohmic electrical properties.

20311 **(PB—82-206905) Characteristics of an equidistant firing system in 12-pulse converter bridges for HVDC.** Juslin, K.; Laiho, Y.; Vauhkonen, V. (Valtion Teknillinen Tutkimuskeskus, Espoo (Finland). Saehkoetekniikan Lab.). May 1981. 33p. NTIS, PC A03/MF A01.

This research paper deals with the construction of a simulation model for a twelve pulse HVDC transmission line. The realized equidistant pulse phase control system is suitable for the operation in weak or strongly unbalanced ac systems from the viewpoint of harmonic instability and suppression of abnormal harmonic currents. The phase of the firing pulses is proportional to an absolute level of the control voltage, and the operation with a constant control angle is possible. The synchronism with an ac system is guaranteed by a phase-locked loop, not by the main control loop. Thus quick and ideal response is obtained. The measurements have shown that this kind of grid control is stable also in many faulty conditions. Abnormal harmonic generation of the converter is very small compared with the traditional systems by utilizing this kind of grid control.

20312 **(PB—82-209776) Analysis of the calibration of metering CCVTS in a utility substation. Final report.** Hillhouse, D.L.; Leep, D.A. (National Bureau of Standards, Washington, DC (USA). Center for Building Technology). Oct 1981. 55p. (NBSIR—81-2360). NTIS, PC A04/MF A01.

This report presents the results of an investigation of unexpected variations in nine 500 kV metering CCVTs, tested for Gulf States Utilities at Baton Rouge, LA. These measurements were performed on three occasions - May 1979, March 1980, and December 1980.

20313 **(PB—82-215419) A simplified system for calibration of CCVTS in the substation. Final report.** Hillhouse, D.L.; Petersons, O.; Sze, W.C. (National Bureau of Standards, Washington, DC (USA)). May 1982. 61p. (NBS-TN—1155). NTIS, PC A04/MF A01.

Coupling capacitor voltage transformers (CCVTs) are widely used for the revenue metering of energy exchanged between utilities at EHV (345-500 kV) interties. These devices are installed permanently in substations, and must be calibrated there. Allowable error is plus or minus 0.3 percent and plus or minus 4.6 mrad (milliradians). This report describes a simplified, lighter, and less costly CCVT calibration system, newly developed and field tested by NBS. The principal elements of this system are a portable reference standard transformer and moderate voltage power supply (14.4 kV), a modular capacitive transfer standard divider, and a voltage comparator. Results obtained with this system agree with the prototype to within plus or minus 0.03 percent and plus or minus 0.1 mrad.

20314 **Adhesive coated electrical apparatus having sublimable protective covering and an assembly method.** Wootton, R.E. (to Dept. of Energy). US Patent 4,343,964. 10 Aug 1982. Filed date 19 Jan 1981. vp.

PAT-APPL-226330.

Electrical apparatus including an enclosure, an electrode disposed within the enclosure, and supports for insulatably supporting the electrode within the enclosure has a permanently sticky adhesive material which is disposed on the interior surface of the outer enclosure. A high-vapor-pressure sublimable material is disposed on the permanently sticky adhesive material, with the sublimable material capable of subliming away in the presence of a vacuum. The presence of the sublimable material enables the apparatus to be nonsticky during assembly and handling operations, while being rendered sticky upon commissioning of the apparatus.

20315 **(OA-tr—2543) Electric power for the island of Borkum.** Becker, T.; Fusen, H.; Moormann, G. Translated from *Elektrizitaetswirtschaft* ; **81**: No. 8, 241-246(13 Apr 1982). 22p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83900469.

In 1980, the power supply to the North Sea island of Borkum was upgraded by the connection of a 30 kv underwater cable. The entire operation is detailed including planning, the construction of the PE insulated cable, the production and testing of the cable, and cable laying.

21 NUCLEAR POWER PLANTS

REFER ALSO TO CITATION(S) 20254, 20268, 20625, 20627, 20818, 20819, 20820, 20821, 20823

20316 **(NUREG/CR—2952) Engineering expertise on shift in nuclear power plants: the foreign experience.** Melber, B.D.; Schreiber, R.E. (Battelle Human Affairs Research Center, Seattle, WA (USA); Pacific Northwest Lab., Richland, WA (USA)). Feb 1983. Contract AC06-76RL01830. 35p. (PNL—4468). NTIS, PC A03/MF A01 - GPO $4.50. Order Number DE83008250.

This report describes the practices of selected foreign countries with providing engineering expertise on shift in nuclear power plants. The extent to which engineering expertise is made available and the alternative models of providing such expertise are presented. The implications of foreign practices for US consideration of alternatives are discussed, with reference to the shift technical advisor (STA) position and to a proposed shift engineer position. The procedure used to obtain information on foreign practices was primarily a review of the literature, including publications, presentations, and government and utility reports. There are two approaches that are in use to make engineering expertise available on shift: (1) employing a graduate engineer in a line management operations position; and (2) creating a specific engineering position for the purpose of providing expertise to the operations staff.

20317 **(SAND—82-2852C) Tactical Improvement and Security Force Evaluation Program.** Chapman, L.D.; Adams, K.G.; Rountree, S.L.K.; Heider, J.A.; Wilde, R.L.; Baehr, D.G. (Sandia National Labs., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 6p. (CONF-830416—1). NTIS, PC A02/MF A01. Order Number DE83007409.

From American Nuclear Society workshop on power plant security; Savannah, GA, USA (24 Apr 1983).

Sandia National Laboratories has worked on the Tactical Improvement and Security Force Evaluation Program for the US Nuclear Regulatory Commission (NRC). This program demonstrates the feasibility of using the Engagement Simulation System (ESS) for security officer response training at licensee nuclear power plants. The ESS, which evolved from Xerox's Multiple Integrated Laser Engagement System (MILES), utilizes weapons with laser transmitters and body harnesses with laser sensors to simulate adversary engagement conditions. The information required by the licensee to utilize the ESS for security officer training is in the form of a Tactical Improvement Package (TIP) which contains two Instructor's Guides. Sandia National Laboratories has made an explanatory film which provides the highlights of the Tactical Improvement and Security Force Evaluation Program. It relates the observation of ESS familiarization exercises conducted at four nuclear power plants to the information given in the TIP documentation and explains the history of the program. It is the intent of the authors for this film to serve as the presentation medium for this paper.

2101 Power Reactors, Non-breeding, Light-water Moderated, Boiling Water Cooled

REFER ALSO TO CITATION(S) 20450, 20452, 20457, 20463, 20477, 20554, 20654, 20656, 20680, 20681, 20683, 20684, 20689, 20691, 20693, 20712, 20718, 20719, 20721, 20722, 20723, 20729, 20730, 20733, 21876

20318 **(ANL/NESC—246) FLOW-MODEL; multi-channel two-dimensional, two-phase flow.** Perry, G.W. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048246.

Maxima of - 20 channels 100 axial nodes 100 axial 1 points.

FLOW-MODEL is a multi-channel, two-dimensional, two-phase flow model designed to compute the axial and radial coolant density and quality profiles, the axial pressure profile, and the weight flow distribution for an open matrix flow, boiling water reactor.IBM360;CDC CYBER73;CDC6600,7600; FORTRAN IV; OS/360 (IBM360), SCOPE (CDC6600,7600), NOS 1.3 (CDC

CYBER73); 240K bytes of memory are needed for the IBM360 version. The CDC CYBER73 version requires 47,000 (octal) words of memory on the CDC6600 and 35,000 (octal) words of memory on the CDC7600.

20319 **(ANL/NESC—328) NURLOC-1.0; loss-of-coolant thermal analysis.** Walters, C.T. (Battelle Columbus Labs., OH (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048328.

Two-dimensional analyses, either single pins or cylindrical shells, are performed.

NURLOC-1.0 performs core/pressure vessel thermal analysis for a nuclear reactor loss-of-coolant accident.CDC6400; FORTRAN IV; SCOPE; 65K or 32K memory with overlay.

20320 **(ANL/NESC—369) RELAP4/MOD6; transient thermal-hydraulic study.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Tolli, J.E. (EG and G Idaho, Inc., Idaho Falls (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048369.

Maxima of - 9 minor edit variables 20 time-step cards 20 trip control cards 100 junctions (flow paths) between volumes 5 bubble-parameter sets 5 time-dependent volume descriptions on cards 12 pumps 75 control volumes 10 check valve types 5 normalized leak-area-versus-time curves 20 fill system curves 50 heat slabs 20 heat slab geometries 7 heat slab materials 50 core sections 99 data sets for heat exchangers without conduction.

RELAP4 has been developed to describe the behavior of water-cooled nuclear reactors subjected to postulated transients, such as those resulting from loss-of-coolant, pump failure, or power excursions. The program calculates fluid conditions such as flow, pressure, mass inventory, and quality; thermal conditions such as surface temperatures, temperature profiles, and energy distributions; and heat fluxes in power generating and dissipating elements. The program also calculates reactor power, decay heat, and reactivity. In addition to describing transients in boiling-water and pressurized-water reactors, the program is sufficiently versatile to describe transients in experimental thermal-hydraulic systems. RELAP4/MOD6 was developed specifically to add a capability to the earlier RELAP codes for calculating PWR reflood phenomena.IBM360,370;CDC7600; FORTRAN IV (95%) and BAL (5%) (IBM360), FORTRAN IV (95%) and COMPASS (5%) (CDC7600); OS/360,370 (IBM360,370), SCOPE (CDC7600); 850K bytes (IBM360), 160,000 (octal) words of SCM and 200,000 (octal) words of LCM (CDC7600), 3 tape drives, and a CalComp plotter.

20321 **(ANL/NESC—461R) EPOCH; neutron age calculation of ENDF/B data.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Schmidt, E. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048461.

The maximum number of groups is 2000 and the maximum number of ENDF/B materials is 10 (or 5 in age calculations). The number of center-of-mass elastic scattering moments read from ENDF/B must be less than 7. The resonant cross sections for any material are ignored.

EPOCH solves for fine detail P1 flux spectra in simply-buckled media and is able to calculate neutron ages from the spectra. It obtains nuclear cross sections from the ENDF/B library, ignoring resonance files, and is most useful for higher energies where resonant reactions are weak or absent. The present version reads only ENDF/B Version 1 tapes.CDC6600; FORTRAN IV; SCOPE 3.1; 140K (octal) memory and 1720K (octal) extended core storage. The amount of extended core storage can be readily reduced for most problems.

20322 **(ANL/NESC—483) REPP; thermal-hydraulic water reactor design.** Hiatt, R.M.; Bromley, C. (Pacific Northwest Lab., Richland, WA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048483.

The REPP computer code provides a method for (1) evaluating fuel temperatures and critical heat flux margins for a fixed reactor core and fuel design, (2) determining the number of fuel pins required to maintain specified heat flux margins from burnout at a given reactor power level, (3) determining the diameter of a fuel pin to design within fuel centerline temperature limits at a specified reactor power level, (4) evaluating the sintering effect on fuel temperature, (5) calculating pressure drop and coolant properties for single-phase and two-phase flow for fuel operating at average reactor conditions and a theoretical hot-pin hot-channel condition, and (6) calculating pressure drop across several types of fuel pin spacers.UNIVAC1108; FORTRAN V; CSCX; 51K addressable core storage.

20323 **(ANL/NESC—512) THETA1B; fuel rod thermal response loss of coolant accidents.** Hocevar, C.J.; Wineinger, T.W. (EG and G Idaho, Inc., Idaho Falls (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048512.

Small time-steps are used, resulting in long running times.

THETA1B computes the thermal response characteristics of a nuclear fuel rod subjected to a loss-of-coolant accident environment.IBM360/75; FORTRAN IV; OS/360; 400K bytes of core memory are required.

20324 **(CONF-810234—2) Two-fluid model formulation and drag correlation for dispersed two-phase flow.** Ishii, M. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 12p. NTIS, PC A02/MF A01. Order Number DE83007778.

From Army Research office workshop on multiphase flow; Aberdeen Proving Ground, MD, USA (2 Feb 1981).

A two-phase flow model can be developed by applying a proper averaging method to a local instant formulation. In a macroscopic formulation based on the averagings, collective interactions of fluid particles and dynamics of the interfaces are modeled through the phase interaction terms. There are two fundamentally different formulations of the macroscopic two-phase flow model, namely, the two-fluid model and mixture model. The two-fluid model is formulated by considering each phase separately in terms of two sets of macroscopic conservation equations governing the balance of mass, momentum and energy of each phase. In the two-fluid model, two momentum equations describe the motions of phases. However, in the macroscopic field, motions of phases are not independent of each other, therefore, the interfacial momentum interaction terms should be specified in the model. Since these momentum interaction terms play the key role in the two-fluid model, they are studied in detail in this paper.

20325 **(CONF-820510—6) Fission reactors and materials.** Frost, B.R.T. (Argonne National Lab., IL (USA)). Dec 1981. Contract W-31-109-ENG-38. 11p. NTIS, PC A02/MF A01. Order Number DE83007595.

From Spring meeting for the Society for the Advancement of Materials and Process Engineering; San Diego, CA, USA (4 May 1982).

The American-designed boiling water reactor and pressurized water reactor dominate the designs currently in use and under construction worldwide. As in all energy systems, materials problems have appeared during service; these include stress-corrosion of stainless steel pipes and heat exchangers and questions regarding crack behavior in pressure vessels. To obtain the maximum potential energy from our limited uranium supplies is is essential to develop the fast breeder reactor. The materials in these reactors are subjected to higher temperatures and neutron fluxes but lower pressures than in the water reactors. The performance required of the fuel elements is more arduous in the breeder than in water reactors. Extensive materials programs are in progress in test reactors and in large test rigs to ensure that materials will be available to meet these conditions.

20326 (DOE/ET/34203—46) Oxygen suppression in boiling water reactors. Phase 2. Annual report 1981, December 2, 1980-December 31, 1981. Burley, E.L. (comp.). (General Electric Co., San Jose, CA (USA). Nuclear Engineering Div.). Jul 1982. Contract AC02-76ET34203. 129p. (NEDC—23856-6). NTIS, PC A07/MF A01. Order Number DE83007939.

A hydrogen addition test will be performed in the Dresden-2 reactor of Commonwealth Edison Company during 1982. Up to 2 ppM hydrogen will be added to and dissolved in the reactor feedwater to reverse the radiolysis reaction in the reactor core and suppress oxgen concentration in the primary coolant. At low oxygen levels the propensity of stressed and sensitized 304 stainless steel toward intergranular stress corrosion cracking is greatly reduced. The test will answer outstanding questions and uncertainties in the areas of water chemistry, equipment design and materials performance. Nine special sample facilities will be prepared in the primary coolant, main stream, feedwater/condensate, and offgas systems. Instrumentation will be available to measure hydrogen, oxygen, conductivity, pH, soluble and insoluble corrosion products, and electrochemical potentials. In addition, an autoclave in which confirming constant extension rate tests can be conducted in reactor water will be provided.

20327 (DOE/ET/34215—31) Fuel-cladding mechanical interaction in PCI-resistant LWR fuel designs during normal operation and power-ramping. Fuel-Performance Improvement Program. Barner, J.O.; Guenther, R.J.; Freshley, M.D. (Pacific Northwest Lab., Richland, WA (USA)). Feb 1983. Contract AC06-76RL01830. 59p. (PNL—4485). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83007205.

The fuel-cladding mechanical interaction behavior of developmental fuel rods irradiated in the Halden Boiling Water Reactor (HBWR) was evaluated based primarily upon rod elongation measurements made during steady-state and power-ramping irradiation. For the nonpressurized reference rods containing solid pellets, there was a relationship between thermal feedback and fuel-cladding mechanical interaction (FCMI) during steady-state irradiation. During power-ramping, the general cladding stress distribution in fuel rods with annular fuel pellets was primarily axial while cladding stresses in rods with sphere-pac fuel was mostly in the hoop direction. The nonpressurized reference design with dished-pellet fuel had significant cladding stresses in both the axial and hoop directions during power-ramping. The work comprises part of the fuel Performance Improvement Program (FPIP) that is sponsored by the US Department of Energy. FPIP participants are Consumers Power Company (CPC), Exxon Nuclear Company (ENC), and the Pacific Northwest Laboratory operated for DOE by Battelle Memorial Institute.

20328 (EPRI-NP—2831) Portable linear accelerator development. Final report. Schonberg, R.G. (Schonberg Radiation Corp., Mountain View, CA (USA)). Jan 1983. 105p. NTIS, PC A06/MF A01. Order Number DE83901573.

The final report on Project RP 822-6 describes the MINAC 3 development from the recognition of need for a lightweight, portable high-energy device to the successful completion and field use of the MINAC. MINAC, which represents a substantial improvement in field radiographic capability and in technology, rapidly transitioned from proof-of-principle (1978 to 1980) to field-proven product (1980 to 1981). As a result, the decision has been made to develop this report as a users guide as well as a historic record of design, development, and testing program. The first section of this report has the following principal objectives: to describe the existing MINAC equipment capabilities and achievable modifications; to provide applications information for prospective users; and to provide technical information on high-energy radiography useful for familiarization and planning. The users guide section is followed by sections which describe the design basis, development, and application history of MINAC through the course of EPRI RP822 research projects 1 to 5, inclusively.

20329 (GRS—39) GARLIC-B. A digital code for real-time calculation of the transient behaviour of nodal and global core and plant parameters of BWR nuclear power plants. Ercan, Y.; Hoeld, A.; Lupas, O. (Gesellschaft fuer Reaktorsicherheit m.b.H. (GRS), Koeln (Germany, F.R.)). Apr 1982. 46p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750179.

A program description of the code GARLIC-B is given. The code is based on a nonlinear transient model for BWR nuclear power plants which consist of a 3D-core, a top plenum, steam removal and feed water systems and a downcomer with main coolant recirculation pumps. The core is subdivided into a number of superboxes and flow channels with different coolant mass flow rates. Subcooled boiling within these channels has an important reactivity feed back effect and has to be taken also into account. The code computes the local and global core and plant transient situation as dependent on both the inherent core dynamics and external control actions, i.e., disturbances such as motions of control rod banks, changes of mass flow rates of coolant, feed water and steam outlet. The case of a pressure-controlled reactor operation is also considered.

20330 (NEDO—24583-1) Mark I containment program structural-acceptance criteria: Plan Unique Analysis Application Guide. (General Electric Co., San Jose, CA (USA). Nuclear Engineering Div.). Oct 1979. 43p. General Electric Co., Nuclear Engineering Division, San Jose, CA 95125.

The purpose of the Plant Unique Analysis Application Guide (PUAAG) is to ensure that the structural acceptance criteria are applied consistently by those evaluating each of the specific containments for the utilities. The assignments included herein are considered to be conservative, but are subject to change as a result of additional efforts of the Mark I Containment Program. Revisions of these assignments are subject to NRC review.

20331 (NUREG—0943) Threaded-fastener experience in nuclear power plants. Koo, W.H. (Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Reactor Regulation). Jan 1983. 30p. NTIS, PC A03/MF A01 - GPO $4.50. Order Number DE83901544.

This report identifies 44 incidents of threaded-fastener degradation and failure in nuclear power plants from October 1964 to March 1982. It provides an overview of some of the threaded-fastener problems that have occurred since 1964. Safety implications of these incidents are discussed, and short-term regulatory actions and ongoing long-term regulatory actions are described. Information included in this report represents the current NRC staff understanding of each issue.

20332 (NUREG/CP—0034-Vol.1, pp 36-54) **Current challenges in light water reactor physics.** Lee, R.R. (Management Analysis Co., San Diego, CA); Ozer, O.; Cobb, W.R. Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

This paper identifies several areas where improvements and continued development of reactor physics methods and tools will find important application in support of utilities with operating reactors. Increased use of analysis tools will be an important contributor in reaching desired levels of safety and performance for operating reactors. Methods developers must put more emphasis on the end usefulnes of code results to speed acceptance and use of analysis tools within utility organizations.

20333 (NUREG/CP—0034-Vol.1, pp 55-77) **Advances in LWR thermal hydraulics.** Jones, O.C. Jr. (Rensselaer Polytechnic Inst., Troy, NY). Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

Clearly the entire field of LWR thermal hydraulics encompasses the entire fields of multiphase flow and heat transfer - a technical review of which is impossible in this short a space. So rather than attempt this, the author has taken an overview perspective of thermal hydraulic nuclear safety methods as they have developed over the last decade - centered on the development of advanced computational systems and their associated physics. Discussions of both the drift flux model and the two-fluid model are given along with the accompanying formulative process descriptions required. The advances which have played a role in these models are delineated and further advances required identified. 67 references.

20334 (NUREG/CP—0034-Vol.1, pp 209-214) **Interaction of neutronics and thermal-hydraulics in the evaluation of BWR stability.** Park, J.K.; Park, G.C.; Becker, M.; Podowski, M.; Lahey, R.T. Jr. (Rensselaer Polytechnic Inst., Troy, NY). Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

Modeling has been performed for the evaluation of the interaction of neutronics and thermal-hydraulics in the analysis of density-wave oscillations. Application of the models show that the interaction is strong, and that stability margin varies considerably with sophistication of neutronics model.

20335 (NUREG/CP—0034-Vol.1, pp 216-219) **Importance of momentum dynamics in BWR neutronic stability.** Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

The predominant feedback mechanism to the power generation dynamics of a BWR is the coupling between neutron reactivity and coolant density in the core. In modern, large BWR's, two main paths contribute to the coolant density reactivity feedback: (1) a direct power-to-coolant density path wich involves the fuel heat transfer and coolant mass and energy dynamics; and (2) a coolant flow rate-to-coolant density path characterized by the coolant momentum dynamics of the entire flow closed loop formed by the core and recirculation system. In this paper, it is shown how the core's neutronic stability (i.e., reactivity-power) is affected by the coolant's momentum dynamics contribution to the density reactivity feedback.

20336 (NUREG/CP—0034-Vol.1, pp 220-235) **BWR core response to fluctuations in coolant flow and pressure, with implications on noise diagnosis and stability monitoring.** Blomstrand, J.H.; Andersson, S.A. (ASEA-ATOM, Vaesteraas, Sweden). Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

Reactor dynamic tests, utilizing sinuosidal oscillations in pressure and recirculation flow, have been conducted in operating BWRs in Sweden and Finland. Test data recorded, as well as recordings of process noise, have been analyzed in terms of dynamic core properties. The results obtained show good qualitative agreement with model predictions of BWR core dynamics. Model studies can often support interpretation of dynamic information obtained from operating plants. Comparisons between model studies, dynamic tests and process noise may also provide improved understanding of test results and noise patterns; in this way it can be demonstrated that some neutron flux noise is caused by noise in coolant flow and steam flow. From reactor test data nd noise recordings, core stability parameters have been evaluated by a number of methods. These have been found to provide essentially the same results. The cores investigated were found to be very stable under normal operating conditions. In special operating points, outside the normal operating range, higher decay ratios may occur. The experience indicates that for BWR cores, operated at decay ratios above quarter damping, the stability parameters may be identified from the oscillatory behavior of the autocorrelation in the time domain of the neutron flux noise.

20337 (NUREG/CP—0034-Vol.1, pp 236-253) **Neutronics analysis of BWR partial scrams with boron injection.** Chexal, B.; Layman, W.; Power, J.; Pickering, R.; Grow, R.; Simonson, C. Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

This article summarizes a reactor neutronics analysis for a transient where some number of control rods do not insert. The analysis is applicable to a typical BWR-4 plant. It focuses on the power distribution in the core and on reactor criticality both with and without standby liquid boron injection. The work is directed towards providing better guidance to the operator regarding boron injection during partial control rod insertion incidents in boiling water reactors.

20338 (NUREG/CP—0034-Vol.1, pp 271-285) **Recent BWR fuel management reactor physics advances.** Crowther, R.L.; Congdon, S.P.; Crawford, B.W.; Kang, C.M.; Martin, C.L.; Reese, A.P.; Savoia, P.J.; Specker, S.R.; Welchly, R. Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

Improvements in BWR fuel management have been under development to reduce uranium and separative work (SWU) requirements and reduce fuel cycle costs, while also maintaining maximal capacity factors and high fuel reliability. Improved reactor physics methods are playing an increasingly important role in making such advances feasible. The improved design, process computer and analysis methods both increase knowledge of the thermal margins which are available to implement fuel management advance, and improve the capability to reliably and efficiently analyze and design for fuel management advances. Gamma scan measurements of the power distributions of advanced fuel assembly and advanced reactor core designs, and improved in-core instruments also are important contributors to improving 3-d predictive methods and to increasing thermal margins. This paper is an overview of the recent advances in BWR reactor physics fuel management methods, coupled with fuel management and core design advances. The reactor physics measurements which are required to confirm the predictions of performance fo fuel management advances also are summarized.

20339 (NUREG/CP—0034-Vol.1, pp 348-363) **Application of nodal methods to light water reactors.** Finck, P.J.; Hoxie, C.L.; Khalil, H.S.; Parsons, D.K.; Henry, A.F. (Massachusetts Inst. of Tech., Cambridge). Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

Systematic methods for determining node-homogenized group parameters and reconstructing local fuel pin powers using only fine-mesh calculations for isolated fuel assemblies - in some cases extended assemblies or color sets - along with two-group nodal calculations for determining reactor eigenvalue and flux distribution are described. Numerical tests for small two dimensional benchmark problems yield maximum errors in local pin powers at beginning of life of ~ 5% for both PWR's and BWR's.

20340 (NUREG/CP—0034-Vol.1, pp 391-405) **Lattice homogenization theory for coarse mesh diffusion analysis.** Chiang, R.T. (General Electric Co., San Jose, CA). Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

A lattice homogenization theory is developed for coarse mesh diffusion analysis in a large heterogeneous system composed of diffusion analysis in a large heterogeneous system composed of two-dimensional, exactly periodic or near-periodic fuel bundles. The development systematically leads to the separation of the solution to the heterogeneous reactor diffusion equation into a local shape function (the fundamental unit-bundle diffusion theory eigenfunction) and a global shape function (the fundamental solution to the bundle-homogenized reactor diffusion equation). The eigenvalue of the homogenized reactor diffusion equation is shown to preserve the eigenvalue of the heterogeneous reactor diffusion equation. The bilinear-weighted homogenized diffusion coefficient and cross-sections are derived in terms of forward and adjoint solutions to the unit-bundle diffusion equation. Discontinuous interface conditions are used in determination of the solution to the homogenized diffusion equation for large systems composed of near-periodic bundles. Numerical results are given for several fictitious light-water slab reactors composed of exactly periodic or near-periodic fuel bundles.

20341 (NUREG/CP—0034-Vol.1, pp 468-478) **Investigation of the axial void propagation velocity profile in BWR fuel bundles.** Kosaly, G. (Univ. of Washington, Seattle); Fahley, J.M.; Behringer, K.; Crowe, R.D. Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

The paper describes the method of measuring axial void propagation velocity in the core of an operating BWR. Experimental data obtained from the noise signals of LPRM and TIP detectors are compared to calculated steam velocity and kinematic wave velocity profiles.

20342 (NUREG/CP—0034-Vol.1, pp 487-497) **Separate effects tests in support of BWR thermal/hydraulic monitoring.** Albrecht, R.W.; Crowe, R.D.; Dailey, D.J.; Khan, H.J.; Kotani, K.; Swoope, S.C. (Univ. of Washington, Seattle). Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

Miniature fission chambers, mounted on a flow section, were used in a small research reactor to characterize two-phase flow. A stochastic description of the structure, dynamics, and propagation is developed. The property of propagation, as measured by neutronic noise analysis, is addressed. The drift flux model is compared to experimental results.

20343 (NUREG/CP—0036, pp 107-120) **Stress corrosion cracking in boiling water reactor (BWR) piping.** Eason, E.D. (Failure Analysis Associates, Palo Alto, CA). Nov 1982. NTIS, PC A13/MF A01 - GPO.

From Workshop on nuclear power plant aging; Bethesda, MD, USA (4 Aug 1982).

Results are presented from recent Electric Power Research Institute projects on stress corrosion cracking in 304 stainless steel Boiling Water Reactor (BWR) piping. Repair rates have been calculated for stress corrosion cracking incidents grouped by piping systems, BWR generations, and individual plants, using non-parametric order statistics techniques. From these results, the original data groups are lumped into statistically-justified populations for further analysis. The rates for different plants or BWR generations are not found to be significantly different, but the rates for different piping systems are. Consequently, the number of repairs per plant per year is calculated separately for several piping systems with all plants lumped together. The repair rate is increasing with plant age in most systems, indicating a time-dependent wear-out phenomenon. The cost-effectiveness of countermeasures such as enhanced inspection, startup deaeration, material replacement, etc., is analyzed with a breakeven approach.

20344 (NUREG/CR—2703) **Investigation of special-purpose processors for real-time synthetic-aperture-focusing techniques for nondestructive evaluation of nuclear-reactor vessels and piping components.** Ganapathy, S.; Schmult, B.; Wu, W.S.; Hamano, N.; Bristor, D. (Michigan Univ., Ann Arbor (USA). Dept. of Electrical and Computer Engineering). Jan 1983. 91p. NTIS, PC A05/MF A01 - GPO $5.50. Order Number DE83901509.

Progress in the development of a special purpose system for use in a real-time in-service inspection system for reactor vessels and piping components is described in this report. An analysis of the synthetic aperture processing algorithm is presented and new methods of speedup are described. A number of special purpose processor architectures are presented and two of the more promising ones are described in detail and are compared and evaluated. Proposed specifications for an initial field inspection system are presented. A brief description of the capabilities of a laboratory prototype processor (to be fabricated) is given.

20345 (NUREG/CR—2805-Vol.2) **LWR Pressure-Vessel Surveillance Dosimetry-Improvement Program. Quarterly progress report, April 1982-June 1982.** Guthrie, G.L.; McElroy, W.N. (Hanford Engineering Development Lab., Richland, WA (USA)). Jan 1983. Contract AC06-76FF02170. 53p. (HEDL-TME—82-19). NTIS, PC A04/MF A01 - GPO $4.75. Order Number DE83007395.

The Light Water Reactor Pressure Vessel Surveillance Dosimetry Improvement Program (LWR-PV-SDIP) has been established by NRC to improve, test, verify, and standardize the physics-dosimetry-metallurgy, damage correlation, and the associated reactor analysis methods, procedures and data that are used to predict the integrated effect of neutron exposure to LWR pressure vessels and their support structures. Research activities by the Hanford Engineering Development Laboratory and the Oak Ridge National Laboratory are reviewed.

20346 (NUREG/CR—2805-Vol.3) **LWR Pressure-Vessel Surveillance Dosimetry Improvement Program. 1982 annual report, October 1, 1981- September 30, 1982.** McElroy, W.N.; Kam, F.B.K.; Grundl, J.A.; McGarry, E.D.; Fabry, A. (Hanford Engineering Development Lab., Richland, WA (USA)). Jan 1983. Contract AC06-76FF02170. 166p. (HEDL-TME—82-20). NTIS, PC A08/MF A01 - GPO $6.50. Order Number DE83007339.

This report describes progress made in the Light Water Reactor Pressure Vessel Surveillance Dosimetry Improvement Program (LWR-PV-SDIP) during FY 1982. The primary concern of this program is to improve, test, verify and standardize the physics-dosimetry-metallurgy and the associated reactor and damage analysis procedures and data used for predicting the integrated effects of neutron exposure to LWR pressure vessels and support structures. These procedures and data are being recommended in a new and updated set of ASTM standards being prepared, tested, and verified by program participants. These standards together with parts of the US Code of Federal Regulations and ASME codes are needed and used for the assessment and control of the condition of LWR pressure vessels and support structures during the 30 to 50 year lifetime of a nuclear power plant.

20347 (NUREG/CR—3108) **Extended-burnup calculations for operating-reactor reload reviews.** Wilson, W.B.; England, T.R.; LaBauve, R.J. (Los Alamos National Lab., NM (USA)). Feb 1983. Contract W-7405-ENG-36. 95p. (LA—9563-MS). NTIS, PC A05/MF A01 - GPO $5.50. Order Number DE83007381.

The core inventories of radionuclides presently used in evaluations of hypothetical reactor accidents are based on calculations intended to be conservative for common fuel enrichments and discharge exposures of about 25,000 megawatt-days per metric ton of uranium (MWd/tU). The objective of this work has been to provide a set of radionuclide inventories that bounds the inventories expected (without anticipated variations in fuel management) for various enrichments, reactor types, and burnup.

20348 (SAND—82-7056) **Peer-review study of the draft handbook for human-reliability analysis with emphasis on nuclear-power-plant applications, NUREG/CR-1278.** Brune, R.L.; Weinstein, M.; Fitzwater, M.E. (Human Performance Technologies, Inc., Thousand Oaks, CA (USA)). Jan 1983. Contract AC04-76DP00789. 231p. NTIS, PC A11/MF A01. Order Number DE83007377.

This report describes a peer review of the draft Handbook for Human Reliability Analysis with Emphasis on Nuclear Power Plant Applications, NUREG/CR-1278. The purpose of the study was to determine to what extent peers agree with the human behavior models and estimates of human error probabilities (HEPs) contained in the Handbook. Twenty-nine human factors experts participated in the study. Twenty of the participants were Americans; nine were from other countries. The peers performed human reliability analyses of a variety of human performance scenarios describing operator activities in nuclear power plant settings. They also answered questionnaires pertaining to the contents and application of the Handbook. An analysis of peer solutions to the human reliability analysis problems and peer responses to the questionnaire was performed. Recommendations regarding the format and contents of the Handbook were developed from the study findings.

20349 RELAP5 constitutive relations modeling. Ransom, V.H.; Chow, H.; Kiser, D.M.; Lin, J.C. (EG & G Idaho Inc., P.O. Box 1625, Idaho Falls, ID 83415). *Transactions of the American Nuclear Society;* **41**: 671-672(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

2102 Power Reactors, Non-breeding, Light-water Moderated, Non-boiling Water Cooled

REFER ALSO TO CITATION(S) 19813, 19895, 20321, 20322, 20323, 20325, 20327, 20328, 20331, 20332, 20333, 20339, 20340, 20344, 20345, 20346, 20347, 20348, 20450, 20452, 20457, 20463, 20477, 20554, 20572, 20617, 20651, 20654, 20656, 20665, 20673, 20674, 20680, 20681, 20682, 20683, 20684, 20689, 20690, 20691, 20697, 20702, 20707, 20708, 20712, 20714, 20715, 20716, 20717, 20718, 20719, 20720, 20722, 20723, 20724, 20730, 20733, 21808

20350 (ANL/NESC—331R) M0219;FLOT1; PWR flow transient analysis. Fuls, G.M. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048331.

The mathematical model, upon which the program is based, is limited to four loops with a maximum of three pumps per loop in parallel.

FLOT1 will predict the steady-state flow and the flow transient due to the subsequent loss of power to all pumps and terminate the transient at a specified time or it will predict the flow transient in which only some of the pumps are lost. This latter transient may be terminated by a maximum transient time or by check valve closures in all loops in which pumping power is lost. In the latter event, the program will predict the subsequent steady-state flow distribution.CDC6600; FORTRAN IV; SCOPE 2.0; The program is designed for card input with both printed and plotted output. The number of core locations required is 55,000 octal..

20351 (ANL/NESC—876) K-TIF; two-fluid PWR downcomer fluid dynamics. Amsden, A.A.; Harlow, F.H. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048876.

The material speeds are assumed to be much smaller than the sound speed at each point so that the microscopic material density for each phase is independent of position.

K-TIF was developed for the numerical solution of the time-varying dynamics of steam and water in a pressurized water reactor (PWR) downcomer. The model is designed to describe the complicated countercurrent flow under start up, steady state and transient flow conditions covering as wide a set of experimental configurations as possible.CDC7600; FORTRAN (LRLTRAN and CHAT compiler); LTSS, SCOPE; 31,000 (octal) words of small core memory (SCM) and 28,000 (octal) words of large core memory (LCM).

20352 (CONF-830318—1) System for automated diagnosis of reactor-coolant pumps. Gabler, H.C.; Stevens, D.M.; Morris, D.J.; Glass, S.W.; Sommerfield, G.A.; Harrison, D. (Toledo Edison Co., OH (USA); USDOE, Washington, DC). 1983. Contract AC02-79ET34019. 3p. NTIS (US Sales Only). Order Number DE83006906.

From 5. power plant dynamics control and testing symposium; Knoxville, TN, USA (21 Mar 1983).

The Reactor-Coolant Pump Monitoring and Diagnostic System will combine seal and rotating machinery analyses to provide continuous, comprehensive, and unattended watch over the four reactor coolant pumps at Davis-Besse. Initial demonstration of the system will provide machine protection, and investigate the opportunity for incipient failure detection. The longer range benefit will be a better understanding of the mechanisms behind seal deterioration which can be drawn upon to reduce or eliminate future seal failures.

20353 (DOE/ET/34015—3) Steam-Generator Dilute-Chemical-Cleaning Program: steam-generator chemical-cleaning project. Annual report for 1981. Simon, G.P.; Smoot, D.E.; Schneidmiller, D. (UNC Nuclear Industries, Inc., Richland, WA (USA)). Dec 1982. Contract AC02-79ET34015. 61p. NTIS, PC A04/MF A01. Order Number DE83008261.

The dilute chemical cleaning program evaluates the feasibility of using low-concentration, regenerable solvents to maintain the secondary side of PWR steam generators in a clean condition. The experimental work carried out during this report period identified an acceptable dilute cleaning solvent formulated with 0.1 wt % each of citric acid, gluconic acid and ascorbic acid. Corrosion rates for the major steam generator construction materials can be limited to <1 mil/day when cinnamonitrile is included in the formulation at a concentration of 0.3 wt % or greater. Regeneration of partially depleted solvent was demonstrated in a recirculating system using strong acid cation exchangers in the H^+ or NH_4^+ form. Solvent pH in the range of 3.4 to 3.8 was maintained during the cleaning operations with chemical additions. It was also demonstrated that mixed-bed resins in the H-OH form are capable of removing residual chemicals after cleaning and restoring coolant quality to a conductivity level of less than 10 μmhos.

20354 (DOE/ET/34019—2) Development of a reactor-coolant-pump monitoring and diagnostic system. Semi-annual progress report, December 1981-May 1982. Morris, D.J.; Gabler, H.C. (Babcock and Wilcox Co., Lynchburg, VA (USA)). Oct 1982. Contract AC02-79ET34019. 81p. (BAW—1746). NTIS, PC A05/MF A01. Order Number DE83007923.

Reactor coolant (RC) pump seal failures have resulted in excessive leakage of primary coolant into reactor containment buildings. In some cases, high levels of airborne activity and surface contamination following these failures have necessitated extensive cleanup efforts and personnel radiation exposure. Unpredictable pump seal performance has also caused forced outages and frequent maintenance. The quality of operating data has been insufficient to allow proper evaluation of theoretical RC pump seal failure mechanisms. The RC pump monitoring and diagnostic system being developed and installed at Toledo Edison's Davis-Besse Nuclear Power Station will examine the relationship between seal failures and three other variables. This report describes system software and hardware development, testing, and installation work performed during the period of December 1981 through May 1982. Also described herein is a parallel effort being conducted by a B & W/Byron Jackson/Utility group to improve pump seal performance.

20355 (EGG-M—19582) Microcomputer simulation of nonlinear two-phase pressurizer dynamics. Tylee, J.L. (EG and G Idaho, Inc., Idaho Falls (USA)). 1983. Contract AC07-76ID01570. 6p. (CONF-830126—1). NTIS, PC A02/MF A01. Order Number DE83006524.

From Conference on modeling and simulation on microcomputers; San Diego, CA, USA (27 Jan 1983).

The dynamics of a pressurized water reactor (PWR) pressurizer are simulated in BASIC using a Commodore PET 2100 Series microcomputer. The simulation, which operates at one-half real-time, models the two-phase interactions within the pressurizer and uses an iterative technique to compute pressure. The simulation performance is evaluated with data from a small test-reactor plant.

20356 (EPRI-NP—2791) Proceedings: support-structure corrosion in steam generators. Shoemaker, C.E.; Jones, D.A. (eds.). (Electric Power Research Inst., Palo Alto, CA (USA); Nevada Univ., Reno (USA). Mackay School of Mines). Jan 1983. 407p. (CONF-8205156—). NTIS, PC A18/MF A01. Order Number DE83901574.

From EPRI workshop on support-structure corrosion in steam generators; Boston, MA, USA (18 May 1982).

Objectives of the workshop were to define limits of water chemistry impurities for various support materials exposed to secondary water for a 40-year lifetime; to review factors affecting corrosion, hideout and return of salts in steam generator crevices; and to discuss additional candidate alloys and tests that would further define and optimize support design to minimize corrosion. The subject areas included: crevice corrosion rates of alloy steels compared to carbon steel; results from examination of support plate segments removed from steam generators; and review of models for corrosion and salt hideout in crevices. The data are intended to provide a basis for utilities to determine their particular design and material needs for steam generator support structures.

20357 (EPRI-NP—2791, pp 1.1-1.36) **Recent Westinghouse experience with tube support plate materials corrosion studies.** Wolfe, C.R. (Westinghouse Electric Corp., Pittsburgh, PA). Jan 1983. NTIS, PC A18/MF A01.

From EPRI workshop on support-structure corrosion in steam generators; Boston, MA, USA (18 May 1982).

The viewgraphs that are presented summarize some of the more significant results of recent tube support corrosion programs at Westinghouse.

20358 (EPRI-NP—2791, pp 2.1-2.30) **Corrosion of support materials.** Krupowicz, J.J. (Combustion Engineering, Inc., Windsor, CT). Jan 1983. NTIS, PC A18/MF A01.

From EPRI workshop on support-structure corrosion in steam generators; Boston, MA, USA (18 May 1982).

Information is presented concerning the corrosion of steam generator tube support materials of 1010 carbon steel, stainless steel-405, stainless steel-409, stainless steel-430, stainless steel-347, and SCR-3.

20359 (EPRI-NP—2791, pp 3.1-3.26) **Preliminary corrosion results on alternative support materials from two model steam generator tests.** Krupowicz, J.J. (Combustion Engineering, Inc., Windsor, CT). Jan 1983. NTIS, PC A18/MF A01.

From EPRI workshop on support-structure corrosion in steam generators; Boston, MA, USA (18 May 1982).

Results of corrosion tests on steam generator tube support materials are presented for stainless steel-347, stainless steel-405, stainless steel-409, SCR-3, and Inconel 600.

20360 (EPRI-NP—2791, pp 4.1-4.29) **Alloy steel corrosion kinetics and oxide morphologies in acid chloride environments.** Forrest, J.E.; Broomfield, J.P. (Central Electricity Research Labs., Leatherhead, England). Jan 1983. NTIS, PC A18/MF A01.

From EPRI workshop on support-structure corrosion in steam generators; Boston, MA, USA (18 May 1982).

The denting of PWR primary water tubes as a result of corrosive attack of the mild steel support plates has led to extensive research into the mechanism of corrosion and a search for palliatives to ease the problem. In the current design of steam generators the mild steel drilled hole tube support plate has been replaced by one of quatrefoil or trifoil shape made of ferritic stainless steel (12%Cr) to ensure that the plates are less vulnerable to attack in the event of adverse boiler water chemistry. The oxide volume is again approximately twice that of the metal consumed but the corrosion mechanism is different from that of the mild steel in that a duplex oxide is formed consisting of an inner chromium rich $(FeCr)_3O_4$ layer surmounted by an outer Fe_3O_4 layer of similar thickness. This study was initiated to investigate the mechanisms of oxide growth and the transition between protective and rapid linear oxidation in order to validate the use of chromium steels for resistance to acid chloride attack and to establish a confidence margin in terms of chromium content and environment.

20361 (EPRI-NP—2791, pp 5.1-5.28) **Measuring corrosion rates in crevices with a computer-controlled flow loop.** McKubre, M.C.H. (Stanford Research Inst., Menlo Park, CA). Jan 1983. NTIS, PC A18/MF A01.

From EPRI workshop on support-structure corrosion in steam generators; Boston, MA, USA (18 May 1982).

The corrosion rate produced by galvanic coupling within a crevice is studied using a computer controlled flow loop. The materials studied include: 1018 carbon steel, stainless steel-405, stainless steel-409, stainless steel-347, and Incoloy 800. A description of the test facilities and electronic equipment is included.

20362 (EPRI-NP—2791, pp 6.1-6.29) **Examinations of support plate samples from steam generators.** Pement, F.W. (Westinghouse Electric Corp., Pittsburgh, PA). Jan 1983. NTIS, PC A18/MF A01.

From EPRI workshop on support-structure corrosion in steam generators; Boston, MA, USA (18 May 1982).

Intersections between Inconel tubing and carbon steel tube support plates were removed from three plants which were undergoing active denting. Each plant had started with phosphate based secondary water treatment, had changed to all-volatile treatment and had experienced some condenser in-leakage of chloride containing cooling waters. All intersection samples contained annuli which were filled with deposits of secondary side additives, contaminants, and corrosion products. Microprobe area scans of the annular space showed zones or bands containing Fe, and in most cases, Ni, Cu, P, Ca, S, Si, Mg, and Zn within the annulus filling material. In some cases, Ni was concentrated near either the tube or the support plate interfaces or both. Chloride was an impurity throughout the material and was also found at the plate-to-annulus interface, sometimes in high relative concentrations. The microanalyses are consistent with a chloride-aided corrosion of the carbon steel support plate material.

20363 (EPRI-NP—2791, pp 7.1-7.23) **Summary of results, Millstone 2 tube support plate examination.** Fackelmann, J.M. (Northeast Utilities Co., Hartford, CT). Jan 1983. NTIS, PC A18/MF A01.

From EPRI workshop on support-structure corrosion in steam generators; Boston, MA, USA (18 May 1982).

Denting at Millstone 2 (MP-2) was caused by exposure to fault chemistry conditions during the first cycle. Comprehensive macro and micro analyses were performed on a sample removed from steam generator (SG) No. 2 to define causative factors. These data generally support an acid chloride mechanism, with a significant copper role. Reduction of chloride level to less than detectable (60 ppB) after the first cycle was not sufficient to stop the progression of denting, although a great improvement was noted. It is evident that complex synergistic factors are operative in the field, as typified by Millstone 2. This work defines some of the complex corrosion products that played a role in producing the local faulted chemistry condition, leading to denting.

20364 (EPRI-NP—2791, pp 8.1-8.19) **Sampling and analysis of lower steam generator support plate - Indian Point 2.** Rothstein, S. (Consolidated Edison Co. of New York, NY). Jan 1983. NTIS, PC A18/MF A01.

From EPRI workshop on support-structure corrosion in steam generators; Boston, MA, USA (18 May 1982).

In 1978, Con Edison developed what appeared to be an acceptable chemical cleaning procedure. However, before proceeding with the actual chemical cleaning of the Indian Point Unit 2 steam generators, it was necessary to qualify the procedure on a sample tube/support plate crevice taken from the steam generator. It was decided that a sample would be removed consisting of 22 tubes comprised of 11 tubes in the first row (which had never been serviced) and 11 tubes in the second row, all adjacent to a flow slot. Procedures for removing the samples are described. Examination of the corroded mild steel support plate is also described.

20365 (EPRI-NP—2791, pp 8.23-8.37) **Examination of a corroded mild steel support plate.** Bell, P.S.; Forrest, J.E.; Libaert, D.F.; Mann, G.M.W. (Central Electricity Research Labs., Leatherhead, England). Jan 1983. NTIS, PC A18/MF A01.

From EPRI workshop on support-structure corrosion in steam generators; Boston, MA, USA (18 May 1982).

The following discussion describes a metallographic examination of a portion of the corroded support plate section removed from Steam Generator No. 23 at Indian Point 2. Rapid corrosion of the mild steel in the annular crevices between tubes and support plate holes had caused denting. The denting caused the narrow ligaments between the flow holes and support holes to fracture. As a result, the support plate fragmented when removed from the steam generator. One of the fragments was used for the examination.

20366 (EPRI-NP—2791, pp 9.1-9.44) **Characterization of model boiler specimens.** Gibbon, D.L.; Varsanik, R.G. (Calgon Corp., Pittsburgh, PA). Jan 1983. NTIS, PC A18/MF A01.

From EPRI workshop on support-structure corrosion in steam generators; Boston, MA, USA (18 May 1982).

This paper describes the general results of an investigation of three crevice corrosion samples provided by Westinghouse from the S112-1 Model Boiler Program. These samples had all been formed under essentially the same initial chemical conditions, but two had been treated with inhibitors at the end of the experimental runs. The first received no neutralization during the model runs, the second was treated with $Ca(OH)_2$ and the third was treated with boric acid. The samples were prepared for examination in several different ways. The samples were characteristic of dented intersections and had the general conformation of a thin-walled inner Inconel cylinder within a thick-walled carbon steel cylinder. An original 12-mil inter-cylinder gap had been packed with powdered magnetite. This magnetite had been augmented by further growth of magnetite during the model runs, making the oxide layer considerably thicker than the original 12-mils in some areas of the samples. The cylinders were sectioned and polished perpendicular to their long axes and the resulting surfaces examined.

20367 (EPRI-NP—2791, pp 10.1-10.49) **Effect of oxygen and oxidizing ions on denting corrosion.** Mann, G.M.W. (Central Electricity Research Labs., Leatherhead, England). Jan 1983. NTIS, PC A18/MF A01.

From EPRI workshop on support-structure corrosion in steam generators; Boston, MA, USA (18 May 1982).

Information is presented concerning solute concentration in a porous layer; solute concentration in a packed crevice; corrosion of a packed carbon steel crevice in $NaCl-O_2$ solutions; and effect of copper on corrosion in $NaCl-O_2$ solutions.

20368 (EPRI-NP—2791, pp 11.1-11.37) **Modeling of salt concentrations in crevices.** Lindsay, W.T. Jr. (Westinghouse Electric Corp., Pittsburgh, PA). Jan 1983. NTIS, PC A18/MF A01.

From EPRI workshop on support-structure corrosion in steam generators; Boston, MA, USA (18 May 1982).

Test facilities and test results are described for the corrosive effects of NaCl solutions on steam generator materials of Inconel 600 and carbon steels.

20369 (EPRI-NP—2791, pp 12.1-12.34) **Impedance studies of the growth of porous magnetite films on carbon steel in high temperature aqueous systems.** Park, J.R.; Macdonald, D.D. (Ohio State Univ., Columbus). Jan 1983. NTIS, PC A18/MF A01.

From EPRI workshop on support-structure corrosion in steam generators; Boston, MA, USA (18 May 1982).

An AC impedance study is described for the corrosion of carbon steel in high temperature (200 and 250°C) chloride-containing (0.998m NaCl + 0.001m $FeCl_2 . 4H_2O$) solutions. The goals of this study were to develop a better understanding of the mechanism of corrosion and film growth, and to derive an electrical model for the interface which subsequently might be used to predict the properties of films formed in crevices in operating PWR steam generators. The objectives are being achieved by the use of wide frequency band-width AC impedance techniques to determine the interfacial transfer function as the corrosion processes evolve with time.

20370 **(EPRI-NP—2806) Monitoring techniques for pH, hydrogen, and redox potential in nuclear-reactor circuits.** MacDonald, D.D.; Scott, A.C.; Wentrcek, P.; McKubre, M.C.H. (SRI International, Menlo Park, CA (USA)). Jan 1983. 84p. NTIS, PC A05/MF A01. Order Number DE83901534.

The development and testing of monitoring instruments to measure the level of corrosivity of high-temperature water in steam power systems are discussed. Specifically, a pressure-balanced, external reference electrode for measuring pH and redox potential is addressed. In addition, the development and demonstration of a platinum redox potential probe and a palladium-dissolved hydrogen gas probe are discussed as well as the development and testing of a pH probe based on palladium.

20371 **(EPRI-NP—2841) Results of EDF/Framatome underclad crack-detection methods. Final report.** Sermadiras, P.; Launay, J.P. (Electricite de France, 93 - Saint-Denis. Groupe des Labs.; Framatome, 92 - Paris La Defense (France)). Jan 1983. 107p. NTIS, PC A06/MF A01. Order Number DE83901446.

In 1978 underclad defects were deteced, in FRANCE, in the base metal of reactor vessel nozzles and steam generator tube sheets. EDF and FRAMATOME then developed examination methods aimed at detecting these cracks in shop and on site: manual and automatic ultrasonic examination of vessel nozzles (70° inclined longitudinal waves), and automatic Eddy Current examination of steam generator tube sheets. Studies are still going on to improve indication characterization and determine crack height.

20372 **(HEDL-TC—2274) Fabrication data package for HEDL-RI dosimetry in the Maine Yankee Replacement Surveillance Capsule 263 and cavity positions.** Kellogg, L.S.; Ulseth, J.A.; Lippincott, E.P.; Oliver, B.; Farrar, H. (Hanford Engineering Development Lab., Richland, WA (USA)). Dec 1982. Contract AC06-76FF02170. 109p. NTIS, PC A06/MF A01. Order Number DE83008400.

This document provides a complete description of dosimetry fabricated for the Maine Yankee Surveillance Capsule Number 263 and three azimuthal positions in the reactor cavity. Surveillance Capsule 263 was originally scheduled for insertion in October 1982, but will be held in reserve for future use, pending establishment of an equilibrium low leakage core burnup distribution. The cavity dosimetry is scheduled for insertion in November 1982.

20373 (NUREG/CP—0034-Vol.1, pp 286-296) **Interaction between core analysis methodology and nuclear design: some PWR examples.** Rothleder, B.M. (Science Applications, Inc., McLean, VA); Eich, W.J. Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

The interaction between core analysis methodology and nuclear design is exemplified by PSEUDAX, a major improvement related to the Advanced Recycle methodology program (ARMP) computer code system, still undergoing development by the Electric Power Research Institute. The mechanism of this interaction is explored by relating several specific nulcear design changes to the demands placed by these changes on the ARMP system, and by examining the meeting of these demands, first within the standard ARMP methodology and then through augmentation of the standard methodology by development of PSEUDAX.

20374 (NUREG/CP—0034-Vol.1, pp 297-314) **Application of static and time-dependent generalized perturbation theory methods in LWR physics analyses.** White, J.R.; Williams, M.L. (Oak Ridge National Lab., TN). Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00. Contract W-7405-ENG-26.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

This paper examines te validity and potential usefulness of generalized perturbation theory (GPT) as a tool in the physics analysis of light water reactor (LWR) systems. Special emphasis is placed on the ability of the time-dependent methodology to quantitatively relate the end-of-cycle state of a realistic PWR model to variations made at earlier times in the cycle. Comparisons between static and time-dependent GPT results are made and the physics implications of the observed differences are briefly discussed. The paper also outlines several generic advantages and disadvantages of perturbation methods,and it is concluded that GPT method represent an attractive alternative to standard brute-force methods for many types of LWR physics analyses. however, there are some types of problems frequently encountered in LWR core calculations for which first-order perturbation theory breaks down, and these are also examined and briefly discussed.

20375 (NUREG/CP—0034-Vol.1, pp 315-332) **Development and validation of core physics methods for in-core fuel management.** Aragones, J.M. (Universidad Politecnica, Madrid, Spain); Ahnert, C.; Gomez-Santamaria, J.; Olavarria, I.R. Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

Under the objective of developing and experiencing a proper core physics calculating capability to perform the in-core fuel management, to evaluate the nuclear core design and startup tests and to support the reactor operation and licensing, a system of neutronic codes and related methods and procedures, has been developed and validated against both the nuclear design results, provided by the reactor vendor and the startup and operating measurements, from a PWR core of 900 MWe started-up in Spain in 1981.

20376 (NUREG/CP—0034-Vol.1, pp 333-347) **Uranium recycle in PWRs.** Darrouzet,M. (CEN/Cadarache, France); Simon, A.; Soldevila, M. Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

Uranium recycling allows a better use of the natural resources, but the accumulation of some uranium isotopes (232, 234 and 236) in the spent fuel results in neutronic and radioprotection problems: the parasitic absorption of U 234 and U 236 which requires an over enrichment of the fuel; and the activity of the spent fuel to be reenriched due to some daughters of U 232. Moreover, a choice has to be made between two reenrichment strategies: must reprocessed uranium be introduced into the natural uranium cycle, or in a specialized one. The first part of this paper is devoted to a brief analysis of these problems. In the second part, the neutronic characteristics are presented of a PWR core loaded with fuel made from reprocessed uranium. These results are compared to those related to a standard fuel loaded core; they were obtained by means of cell and core calculations. In the discussion, the importance of some phenomena (self shielding, spectral variation) is pointed out.

20377 (NUREG/CP—0034-Vol.1, pp 424-439) **Review of proposed instrumentation for measurement of inadequate core cooling in LWRs.** Bailey, P.G.; Merilo, M. (Electric Power Research Inst., Palo Alto, CA). Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

Recent events in the nuclear industry have resulted in an increase of attention and emphasis toward the development and use of instrumentation systems to measure the approach to inadequate core cooling conditions in light water reactors. A large number of instrumentation concepts and systems have been proposed for this purpose. Of the systems which have actually been constructed, few have been thoroughly tested. The various concepts and systems are reviewed and their status, capabilities, and limitations briefly discussed. Two instrumentation systems based upon the use of differential pressure measurements and heated junction thermocouples have been developed and partially tested by Westinghouse and Combustion Engineering, respectively. As the NRC has recently recommended the generic approval of these two systems, many utilities are expected to pursue the use of thee systems to satisfy NRC requirements.

20378 (NUREG/CP—0034-Vol.1, pp 479-486) **Use of conductance probe method to measure two phase flow pattens.** Huahun, G.; Chuanjing, T. (Xi'an Jiaotong Univ., China). Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

A set of double conductance probes is used to measure the flow patterns in two phase horizontal straight and helical flow. Both the visual and conductance probe methods agree moderately well.

20379 (NUREG/CP—0034-Vol.1, pp 498-505) **Accuracy of power peaking monitoring using fixed incore detector systems.** Rombough, C.T.; Guthrie, B.A.; Clark, R.E.; Warren, H.D. Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

A definitive sensitivity study has quantified the error associated with using a fixed incore detector system to monitor the peak pwoer ina nuclear reactor core. Results of this study show that by using a recently developed curve fit technique, the error is less than 2% (for a peak of 1.5 RPD) for 5 or more fixed detectors in the fuel assembly. This technique incorporates some innovative improvements which minimize the curve-fit error. Grids are realistically simulated in the fitted curves and extrapolation points are determined as a function of the measured signal at each end. With these improvements, afixed system can produce an accurate representation of the axial flux shape within the assembly on a continuous basis.

20380 (NUREG/CP—0036, pp 176-189) **Methods for predicting strain in dented steam generator tubes from profilometry data.** Derbalian, G.; Johnston, P.R. (Failure Analysis Associates, Palo Alto, CA). Nov 1982. NTIS, PC A13/MF A01 - GPO.

From Workshop on nuclear power plant aging; Bethesda, MD, USA (4 Aug 1982).

Steam generator tubes become dented due to the growth of oxide between the tube and its support structure. When the denting becomes severe, the tube must be plugged to prevent the possibility of primary water leakage. A number of factors, including tube strain, determine the optimal time for plugging. Tube strains cannot be measured directly, and thus, tube strain must be predicted from profilometry measurements. The prediction of tube strain requires two steps: definition of tube shape from radial displacements measured by a probe, and determination of strain from the defined tube shape. Procedures for both of these steps are presented and compared. Recommendations for the use of these methods and future probe developments are given.

20381 (NUREG/CP—0036, pp 245-255) **Statistical performance analysis of salt water cooled pressurized water reactors.** Feldman, B. (Nuclear Technology Maintainability Research, Somerville, MA). Nov 1982. NTIS, PC A13/MF A01 - GPO.

From Workshop on nuclear power plant aging; Bethesda, MD, USA (4 Aug 1982).

Pressurized water reactors (PWRs) using salt or brackish cooling water are found to have significant long-term decreases in capacity factors and increases in forced outage rates (FORs) due to equipment failures and maintenance needs. Larger units have significantly lower capacity factors and higher FORs. The significance and magnitude of this correlation increases with unit age. Post-Three Mile Island effects are controlled for.

20382 **(NUREG/CR—2993) Examination of failed studs from No. 2 steam generator at the Maine Yankee Nuclear Power Station.** Czajkowski, C. (Brookhaven National Lab., Upton, NY (USA)). Feb 1983. Contract AC02-76CH00016. 32p. (BNL-NUREG—51594). NTIS, PC A03/MF A01 - GPO $3.75. Order Number DE83008254.

Three studs removed from service on the primary manway cover from steam generator No. 2 of the Maine Yankee station were sent to Brookhaven National Laboratory (BNL) for examination. The examination consisted of visual/dye penetrant examination, optical metallography and Scanning Electron Microscopy/Energy Dispersive Spectroscopy (SEM/EDS) evaluation. One bolt was through cracked and its fracture face was generally transgranular in nature with numerous secondary intergranular cracks. The report concludes that the environmenally assisted cracking of the stud was due to the interaction of the various lubricants used with steam leaks associated with this manway cover.

20383 **(TES/TR—4599-1) Continued investigation of the failure of Midland Unit 1 RPV anchor studs: data report.** (Teledyne Engineering Services, Waltham, MA (USA)). 11 Feb 1981. 61p. Teledyne Engineering Services, 303 Bear Hill Road, Waltham, MA 02154.

Teledyne Engineering Services (TES), under contract to Bechtel Associates Professional Corporation, had conducted an investigation of the preservice failure of three reactor vessel anchor studs at the Consumers Power Company, Midland Plant, Unit 1. The results of that investigation, and interpretation of these results were presented in TES reports TR-3887-1, TR-3887-2, and TR-3887-1, Addendum 1. Subsequently, TES, under contract with Consumpers Power Company (CPCO) has conducted further testing. The primary purpose of this testing was to identify the cause of the high hardness in the Midland Unit studs. Secondary objectives included trying to learn more about the distribution of hardness in the failed stud (number 35) and determine the Charpy transition temperatures for number 3 stud material. This report presents the results of the further testing, and where appropriate, presents results from the previous reports. No attempt is made at interpretation of these results.

20384 (TES/TR—4599-2) Continued investigation of the failure of Midland Unit 1 RPV anchor studs analysis report. (Teledyne Engineering Services, Waltham, MA (USA)). 11 Feb 1981. 27p. Teledyne Engineering Services, 303 Bear Hill Rd., Waltham, MA 02154.

Teledyne Engineering Services (TES) under contract to Bechtel Associates Professional Corporation studied the preservice failure of three Reactor Vessel Anchor Studs in Consumers Power Company's (CPCO) Midland Unit 1. The results of this failure analysis were presented in TES reports TR-3887-1, TR-3887-1 Addendum 1, and TR-3887-2. While the investigation summarized in those reports clearly shows the cause of failure was stress corrosion in studs that were harder than expected for specific material, what was lacking was an explanation of how the studs came to be so hard. Subsequently, TES, under contract with CPCO has conducted further testing, the primary goal of which was to explain the cause of the high hardness. Secondary goals were to measure hardness distributions along the length of the studs and determine why some studs exhibited hardness gradients while others did not. The results of this further effort were presented in TR-4599-1, Further Investigations of High Hardness in Midland Unit 1 RPV Anchor Studs. This report provides a more detailed discussion and interpretation of the results presented in TR-4599-1 to the extent that these results relate to the cause for high hardness.

20385 (UCID—19470) Technical evaluation report on the proposed technical specification change on the surveillance requirements for the response-spectrum recorder at Arkansas Nuclear One, Unit 2. (Docket No. 50-368). Selan, J.C. (Lawrence Livermore National Lab., CA (USA)). 1 Feb 1983. Contract W-7405-ENG-48. 6p. NTIS, PC A02/MF A01. Order Number DE83007318.

This report documents the technical evaluation of the proposed Technical Specification surveillance requirements for the response-spectrum recorder at Arkansas Nuclear One, Unit 2. The evaluation is to determine if the proposed change in surveillance frequency will still maintain insurance that the seismic instrument will be adequately surveillanced to determine any performance degradation. The proposed change in surveillance frequency will insure that the response-spectrum recorder will adequately be tested and calibrated to detect system performance degradation.

20386 (DP-tr—39) Determination of isotopic and gravimetric content of uranium and plutonium by mass spectrometry in nitric acid extraction solutions. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA)). Sep 1982. Contract AC09-76SR00001. Translation source information not available . 17p. NTIS, PC A02/MF A01. Order Number DE83008578.

This technique is for measuring the isotopic content and concentrations of uranium and plutonium in P.W.R. type spent fuel extraction solutions.

20387 Review of operating history at the Palisades nuclear plant. Mays, G.T.; Harrington, K.H. (Oak Ridge National Laboratory, Oak Ridge, TN 37830). *Transactions of the American Nuclear Society;* **41**: 550-551(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

20388 In-service inspection of system generator tubes with multiple-frequency eddy currents. Dodd, C.V.; Deeds, W.E. (Oak Ridge National Laboratory, Oak Ridge, TN 37830). *Transactions of the American Nuclear Society;* **41**: 296-297(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

20389 Initial inspection of a service degraded steam generator removed from service. Wheeler, K.R.; Clark, R.A. (Battelle-Pacific Northwest Laboratory, P.O. Box 999, Richland, WA 99352). *Transactions of the American Nuclear Society;* **41**: 297-298(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

2103 Power Reactors, Non-breeding, Graphite Moderated

REFER ALSO TO CITATION(S) 19800, 19801, 20450, 20457, 20463, 20479, 20480, 20481, 20482, 20483, 20484, 20485, 20486, 20487, 20488, 20489, 20490, 20623, 20667, 20688, 20694

20390 (ANL/NESC—117) FEVER; one-dimensional, few-group diffusion depletion program. Wang, C.L. (Institute of Nuclear Energy Research, Lung-Tan (Taiwan)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048117.

Maxima of - 150 mesh points 20 spatial regions 25 isotopes or aggregates in each region 4 groups It is assumed that the shape of the flux spectrum and the relative amplitude of the flux between zones does not change over the burnup time-step.

FEVER was developed to evaluate the effects of fuel depletion and control rod withdrawal upon the power distribution of the HTGR. The program performs one-dimensional, few-group depletion calculations. Options are available to adjust control poisons in various regions of the reactor, according to a specified sequence, to represent self-shielding of lumped poisons, and to calculate maximum k-effective at operating temperature and k-effective at shutdown temperature and cold shut-down k-effective at shutdown temperature for each time-step. The xenon-override problem can also be investigated.CDC CYBER73,175;CDC7600; FORTRAN IV; NOS/BE 1.2, 1.3 (CDC CYBER73), SCOPE 2.1 (CDC7600); 76,000 (octal) words of memory are required for execution.

20391 (ANL/NESC—261) GADOSE;DOSET; HTGR accident analysis dose calculations. Sedgley, D.B. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048261.

The problem is restricted to 5 time solutions and 5 dose-distance solutions. There is no limit on the number of decay chains but each chain is limited to 6 isotopes. DOSET accepts up to 8 discrete fission-product activity additions as a function of time .

The GADOSE program calculates radioactivity and doses resulting from instantaneous accidental release of activity while the companion program DOSET includes the effects of a time-dependent accidental fission product release for the HTGR type of plant. Given an initial fission product inventory released into a reactor vessel or containment volume, the quantity of each isotope is calculated at a number of times at a number of locations (in the containment, containment recirculating cleanup filters, leak collector, plant exhaust filters and in the atmosphere at a number of distances from the plant). Each decay chain is calculated separately considering buildup and decay of each isotope. Radiological doses are calculated for any three body organs and the whole body based on meteorological and physiological input parameters. Fallout and rainout are included.UNIVAC1108; FORTRAN IV; EXEC2; 32K memory.

20392 **(DOE/SF/02034—T80) Economic ground rules for the HTGR program for 1983.** (Gas-Cooled Reactor Associates, La Jolla, CA (USA)). Jan 1983. Contract AC03-78SF02034. 12p. NTIS, PC A02/MF A01. Order Number DE83007129.

Assumptions used for economic analyses within the HTGR program are discussed under the following main headings: basic assumptions; financial structure and factors; fuel and electricity cost projections; operations and maintenance costs; indirect rates, escalation, and interest during construction; availability; and uncertainty.

20393 **(Juel—1793) Development of a three-dimensional computer code for reconstructing power distributions by means of side reflector instrumentation and determination of the capabilities and limitations of this method.** Knob, P.J. (Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Reaktorentwicklung). Jul 1982. 123p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83750185.

Diss. submitted to Technische Hochschule Aachen (Germany, F.R.).

This work is concerned with the detection of flux disturbances in pebble bed high temperature reactors by means of flux measurements in the side reflector. Included among the disturbances studied are xenon oscillations, rod group insertions, and individual rod insertions. Using the three-dimensional diffusion code CITATION, core calculations for both a very small reactor (KAHTER) and a large reactor (PNP-3000) were carried out to determine the neutron fluxes at the detector positions. These flux values were then used in flux mapping codes for reconstructing the flux distribution in the core. As an extension of the already existing two-dimensional MOFA code, which maps azimuthal disturbances, a new three-dimensional flux mapping code ZELT was developed for handling axial disturbances as well. It was found that both flux mapping programs give satisfactory results for small and large pebble bed reactors alike.

20394 **(Juel-Conf—43) Chemistry of the high-temperature reactor.** Nieder, R. (Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.)). Nov 1981. 131p. (In German). (CONF-8111130—). NTIS (US Sales Only), PC A07/MF A01. Order Number DE83750180.

From Seminar of the KTG on chemistry and nuclear waste disposal; Juelich, F.R. Germany (5 Nov 1981).

Main topics: Graphite corrosion, helium contaminations, fission- and activation products, tritium balance, experience during reactor operation, nuclear waste disposal.

20395 (Juel-Conf—43, pp 5-18) **Development trends of the high-temperature reactor.** Schulten, R. Nov 1981. (In German). NTIS (US Sales Only), PC A07/MF A01.

From Seminar of the KTG on chemistry and nuclear waste disposal; Juelich, F.R. Germany (5 Nov 1981).

In the long-term applications of the HTR-type reactor for the upgrading of coal and other processes to use nuclear process heat, possibilities arise to apply these methods on an industrial scale. From the point of view of engineering, it is possible to introduce big industrial HTR-type reactors of 1000 Msub(wel); small HTR-type reactors are already used on an industrial scale in the heat market.

20396 (Juel-Conf—43, pp 19-29) **Basic aspects of HTR chemistry.** Nieder, R. Nov 1981. (In German). NTIS (US Sales Only), PC A07/MF A01.

From Seminar of the KTG on chemistry and nuclear waste disposal; Juelich, F.R. Germany (5 Nov 1981).

Coolant chemistry describes the reactions of the trace impurities of helium with the core graphite and the metallic internals as well as the reactions of the impurities with each other. Graphite corrosion in particular has special importance in practice. Further, the formation of inflammable gas mixtures must be prevented.

20397 (Juel-Conf—43, pp 53-76) **Helium impurities in a PNP-primary coolant circuit.** Reif, M. Nov 1981. (In German). NTIS (US Sales Only), PC A07/MF A01.

From Seminar of the KTG on chemistry and nuclear waste disposal; Juelich, F.R. Germany (5 Nov 1981).

The concentration of impurities to be expected have been defined in consideration of recent findings concerning the rates of infiltration and formation and the reaction mechanisms of the impurity components in the circuit. The data obtained correspond with the requirements on the metallic high-temperature components as well as with the requirements of limited graphite corrosion.

20398 (Juel-Conf—43, pp 77-84) **Behaviour of fission products in fuel elements of the AVR-core.** Hilgedieck; Wahl, J. Nov 1981. (In German). NTIS (US Sales Only), PC A07/MF A01.

From Seminar of the KTG on chemistry and nuclear waste disposal; Juelich, F.R. Germany (5 Nov 1981).

The fuel elements of the THTR-1-type-, THTR-2-type-, and CFB-2-type reactor have an extraordinary retention capacity for all fission products. Pressed-carbide fuel elements, however, at a temperature above 300°C release considerable Sr- and Eu-activities as a result of diffusion through intact PyC-layers. For GLE-1 and GFB-1 fuel elements a considerable release of cesium has been observed which is caused by defective coated particles.

20399 (Juel-Conf—43, pp 85-94) **Behaviour of fission- and activation products in the cooling circuit.** Malinowski, J.; Wahl, J.; Nieder, R. Nov 1981. (In German). NTIS (US Sales Only), PC A07/MF A01.

From Seminar of the KTG on chemistry and nuclear waste disposal; Juelich, F.R. Germany (5 Nov 1981).

The concentration of the noble gases in the primary circuit is low. It is not much influenced by the helium purification plant. Concerning the concentrations of solid fission products in helium, even lower values have been found. The graphite in the core is a sink for the solid fission products. Only krypton 85 and xenon 133 are released into the environment.

20400 (Juel-Conf—43, pp 95-106) **Tritium-balance in the HTR-type reactor.** Roellig, K. Nov 1981. (In German). NTIS (US Sales Only), PC A07/MF A01.

From Seminar of the KTG on chemistry and nuclear waste disposal; Juelich, F.R. Germany (5 Nov 1981).

In a 2250 MWsub(th)-HTR-type reactor 16,000 Ci of tritium are produced per full load year; a major part of it is retained in the fuel elements. More than 99% of the released tritium comes into the gas purification plant where it is burnt catalytically. Tritium sinks of the primary coolant circuit are sorption in the graphite and the permeation through heat-exchanging components.

20401 (Juel-Conf—43, pp 107-122) **Operating experience in HTR-type reactor chemistry.** Forsyth, N.; Nieder, R. Nov 1981. (In German). NTIS (US Sales Only), PC A07/MF A01.

From Seminar of the KTG on chemistry and nuclear waste disposal; Juelich, F.R. Germany (5 Nov 1981).

Operating experience of the Dragon-, Fort St. Vrain and Peach-Bottom reactors as well as with the AVR-reactor have proved that the 'coated particles' are suitable. Helium impurities, water ingress on a large scale, and small oil infiltrations only cause outages. High CH_4 concentrations do not occur. The He-3 concentration of the natural helium leads only to a rather low tritium contamination.

20402 **(Juel-Spez—150) Program module simulating a gas-heated steam generator with steam condensation in the primary flow channel.** Meister, G. (Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Nukleare Sicherheitsforschung). May 1982. 45p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750192.

A program module, written as a FORTRAN subroutine, is described which simulated the behaviour of a countercurrent steam generator heated on the primary side by a mixture of a noncondensable gas and water steam. The module simulates possible steam condensation in the primary channel. The routine which has been optimized with regard to computing time requirements can be used, for instance, as a module in computer programs simulating water ingress accidents in high temperature reactors.

20403 **(NUREG/CR—2929) Feasibility of monitoring the strength of HTGR core support graphite: Part III.** Morgan, W.C.; Davis, T.J.; Thomas, M.T. (Pacific Northwest Lab., Richland, WA (USA)). Feb 1983. Contract AC06-76RL01830. 49p. (PNL—4449). NTIS, PC A03/MF A01 - GPO $4.75. Order Number DE83007941.

Methods are being developed to monitor, in-situ, the strength changes of graphite core-support components in a High-Temperature Gas-Cooled Reactor (HTGR). The results reported herein pertain to the development of techniques for monitoring the core-support blocks; the PGX graphite used in these studies is the grade used for the core-support blocks of the Fort St. Vrain HTGR, and is coarser-grained than the grades used in our previous investigations. The through-transmission ultrasonic velocity technique, developed for monitoring strength of the core-support posts, is not suitable for use on the core-support blocks. Eddy-current and ultrasonic backscattering techniques have been shown to be capable of measuring the density-depth profile in oxidized PGX and, combined with a correlation of strength versus density, could yield an estimate of the strength-depth profile of in-service HTGR core support blocks. Correlations of strength versus density and other properties, and progress on the development of the eddy-current and ultrasonic backscattering techniques are reported.

20404 **(ORNL/TM—8141) Survey analysis of radiation levels in the HTGR lower regions.** Slater, C.O.; Cramer, S.N. (Oak Ridge National Lab., TN (USA)). Feb 1982. Contract W-7405-ENG-26. 49p. NTIS, PC A03. Order Number DE82011305.

A survey analysis of radiation levels within the General Atomic conceptual 900-MW(e) [~ 2000-MW(t)] steam-cycle High-Temperature Gas-Cooled Reactor (HTGR) was performed. Primary emphasis was placed on calculating thermal neutron flux levels in the HTGR lower regions after giving due considerations to (1) neutron streaming through the large coolant holes in the bottom reflectors and support blocks and (2) thermal neutron streaming among boron pins within the graphite reflector blocks. The final aim was to determine the effect of this composite neutron streaming on the thermal neutron flux in the cover plates for the sidewall insulation. A design limit thermal neutron fluence of 10^{17} cm^{-2} was placed on the cover plates. Calculated results show this limit being exceeded by a factor of 10.5. However, large uncertainties in the calculations indicate a need for a definitive comparison of calculated and experimental results for a prototypic geometry. Other radiation levels were calculated to be well within the dsign limits.

2104 Power Reactors, Non-breeding, Otherwise Moderated Or Unmoderated

20405 **(CONF-810130—3) CANDU nuclear power plants: safety, licensing, and environmental considerations.** van Erp, J.B. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 26p. NTIS, PC A03/MF A01. Order Number DE83007772.

From American Association for the Advancement of Science symposium; Toronto, Ontario, Canada (8 Jan 1981).

CANDU nuclear power plants have a number of safety-related and environmental characteristics, which differ substantially from those of light-water-reactor (LWR) plants. Among the principal of these CANDU characteristics are: (1) the presence of a large low-temperature heat sink dispersed throughout the core region, (2) the absence of thick-walled, highly radioactive primary system components, and (3) the possibility of replacing vital core internals, including pressure tubes. The paper examines these and other characteristics and concludes that (a) the CANDU reactor can be expected to have a quite favorable overall probabilistic risk profile, (b) the environmental impact associated with CANDU reactors is expected to be favorably affected by the possibility of reusing the same site and civil engineering structures for successive generations of power plants through refurbishing and decommissioning of old plants. It is expected that introduction of CANDU reactors into a country, having a licensing process which has been strongly influenced by LWR technology, will not present any serious licensing problems.

20406 **Possibility of multiple temperature maxima in geologic repositories for spent fuel from nuclear reactors.** Beyerlein, S.W.; Claiborne, H.C. (Chemical Technology Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Journal of Heat Transfer;* **104**: No. 1, 180-217(Feb 1982). Contract W-7405-ENG-26.

Heat transfer studies for CANDU spent fuel repositories showed that two temperature maxima at the source could occur: one at ~60 and another one at ~13,000 yrs. Spent fuel from pressurized water reactors (PWRs) did not exhibit this phenomenon. Because CANDU spent fuels display a monotonically decreasing heat generation rate, it is not immediately obvious why such behavior occurs. This paper demonstrates that the "double-peak" phenomenon is due to the presence of the right mixture of short and long-lived nuclides in the fuel and that the second peak does not occur for repository sizes less than ~1 km^2. For larger repositories, radial and surface heat transfer reduces the magnitude of the second peak.

2105 Power Reactors, Breeding

REFER ALSO TO CITATION(S) 19831, 20325, 20554, 20618, 20619, 20647, 20653, 20659, 20661, 20671, 20672, 20676, 20677, 20678, 20679, 20687, 20692, 20706, 20719, 20725, 20726, 20730

20407 **(ANL/NESC—372) RAPFU; fuel cycle parameters for fast breeders.** Greebler, P.; Cowan, C. (General Electric Co., San Jose, CA (USA). Advanced Products Operation). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048372.

Four plutonium recycle schemes are available. The most complicated of these uses two core isotopic zones plus a zone containing the blanket zones. The other three use only a single core isotopic zone and allow a selection to be made from three alternate mixtures in the plutonium discharged from the core and blanket regions and recycled back into the core regions. Up to 100 regions of different composition may be used, and the regions within any zone of fixed plutonium input isotopic composition do not have to be connected.

RAPFU calculates equilibrium fuel cycle isotopics in fast breeder reactors. The recycled plutonium is permitted to have different isotopic compositions in two different core zones, and several recycle schemes are available as options. Output data includes the initial, average, and discharged fuel isotopic concentrations for each region of the core zones and the blankets, breeding ratio, doubling time, and (optionally) fuel costs calculated using simplified relationships.GE635; FORTRAN IV.

20408 **(ANL/NESC—454) PHENIX; 2-dimensional diffusion burnup refueling history.** Hirons, T.J. (Lawrence Livermore National Lab., CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048454.

Maximum of - 50 energy groups Variable dimensioning is used with nearly all subscripted variables stored in a single 27,000 word array.

PHENIX is a two-dimensional, multigroup, diffusion-burnup-refueling code for use with fast reactors. The code is designed primarily for fuel-cycle analysis of fast reactors and can be used to calculate the detailed burnup and refueling history of fast breeder reactor concepts having any generalized fractional batch reloading scheme. Either ordinary keff calculations or searches on material concentration or region dimensions can be performed at any time during the burnup history. The complete fuel cycle history can be calculated in one run, or the individual burnup intervals can be treated separately. The refueling option of the code accounts for the spatial flux shifts over the reactor lifetime in the calculation of fuel discharge.CDC6600; FORTRAN IV; SCOPE 3.2; 65K memory, 1 random-access storage device (disk), and 2 magnetic tape units. If cross sections are input from cards, only one tape unit is required. The other tape unit is used for flux guesses or dumps (if desired), and to store burnup data needed for the refueling portion of the program.

20409 (ANL/NESC—458) **VELVET2; turbulent flow in LMFBR rod bundle.** Bender, D.J.; Magee, P.M. (General Electric Co., Sunnyvale, CA (USA). Breeder Reactor Development Operation). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048458.

Maxima of - 10 radial divisions in the fuel 5 radial divisions in the clad 10 radial divisions in the coolant between the outer edge of the buffer layer and one-half the pitch 10 circumferential divisions; Source deck (3486 cards) Sample problem (51 cards) Reference report, GEAP-10052, and Subroutine Descriptions.

VELVET2 solves the coupled, heat-transfer equations in the fuel, gap, cladding, and coolant for a triangular-spaced, close-packed, fuel rod bundle with liquid metal coolant. The model includes temperature-dependent material properties, turbulent velocity distribution in the coolant, and contributions to coolant heat transfer by turbulent mixing.GE635; FORTRAN IV; GECOS; 32K memory.

20410 (ANL/NESC—480) **FUMBLE; fast reactor fuel burnup & management.** Greebler, P.; Cowan, C.L. (General Electric Co., Sunnyvale, CA (USA). Breeder Reactor Development Operation). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048480.

FUMBLE computes the fuel burnup in reactor operations. This includes the evaluation of reactivity effects, breeding (or depletion) and inventories of fuel, and fuel costs for changing economic conditions and supplied fuel compositions throughout the reactor lifetime (or for as many refueling operating intervals as desired). Considerable flexibility is allowed in the specifications of reactor refueling, including fuel compositions for the startup reactor, recycle schemes and fissile makeup compositions for subsequent core loadings, amounts of fuel to be replaced in different positions of the reactor at any refueling, and shuffling of fuel from one part of the reactor to another or temporarily storing fuel discharged from the reactor for later additional burnup. The refueling specifications may be changed from one refueling operating interval to another, as well as operating interval time, power rating, and load factor. Fuel costs may be evaluated for several different sets of cost input data (different economic assumptions) and may be based on net costs accrued and energy produced by spent fuel batches and/or on net costs incurred for all fuel held and energy produced by the entire reactor for each operating interval.GE635; FORTRAN IV; GECOS-III; Minimum computer memory is 48K on the GE635. Two tapes and one auxiliary which may be required for some cases.

20411 (ANL/NESC—495) **SYN; 2-dimensional synthesis multigroup diffusion and 1-group depletion.** Kelley, M.D. (General Electric Co., Sunnyvale, CA (USA). Breeder Reactor Development Operation). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048495.

SYN contains two major segments, BISYN and BICYCL. The BISYN segment solves the two-dimensional multigroup neutron diffusion theory equations in r,z or x,y geometry using a noniterative synthesis method. This approach is designed to greatly reduce the computer cost of running two-dimensional multigroup problems at the risk of some loss in accuracy of the detailed flux distribution. This segment also contains a perturbation and effective delayed neutron fraction calculation. The BICYCL segment uses output from BISYN to solve the one-group neutron depletion equations. BICYCL allows the user to search on makeup or recycle isotopic compositions for a first cycle of a first core or for equilibrium concentrations. It also has provisions for fuel shuffling and the option to cycle back to BISYN in order to update the fluxes, one-group cross sections, etc.GE635; FORTRAN IV and GMAP; GECOS III; 51K of fast memory, 2 tape drives and 821,760 words of peripheral storage.

20412 (ANL/NESC—501) **ENDRUN2; multigroup constants from ENDF/B data.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Turner, J.E. (General Electric Co., San Jose, CA (USA). Nuclear Energy Div.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048501.

ENDRUN2 is used to calculate multigroup constants from energy-dependent, microscopic cross sections, resonance parameters, and inelastic level data input in the evaluated nuclear data file (ENDF/B) formats. Data is processed for one material at a time and the output multigroup file includes both infinitely-dilute group cross sections and self-shielding, Bondarenko-type f-factors so that the resulting generalized file is independent of reactor composition. The multigroup data may be output on punched cards, a standard library tape, or plotted over any energy range.GE635; FORTRAN IV except for use of RWSBT and NPOST in the GE compressed binary input and output routines. FORTRAN versions of these routines are available, also.; GECOS III; The code requires 52K memory, including a 10K overlap with loading routines. Up to 5 tapes and 7 auxiliary units (disks in the authors' environment) may be required, but the number of tapes may be reduced by use of permanent disk files with the card reader as the input unit.

20413 (ANL/NESC—868R) **PECS3; probabilistic evaluation cladding life.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy, J.H.; Krommenhock, F.J. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048868.

Maxima of - 200 hour time-step 30 rod groups 10 burnup increments per rod group 100 bins per damage fraction histogram 100 bins per optional graph 80 bins per time-to-failure histogram Minimum of - 25 hour time-step The user can generate a regression equation predicting a selected response as a function of up to 19 selected independent variables. .

PECS3 is designed to calculate the probability distributions for various lifetime criteria for sealed plenum FBR fuel pins. The PECS model is capable of predicting cladding stresses and strains and accumulated damage due to fission gas pressure and fuel-cladding mechanical interaction. The position of failure may be located by analyzing a single pin at more than one axial location. Whole-core analyses may be performed by modeling up to 30 pin groups simultaneously. The damage rule and failure criteria used are selectable by the user for each analysis.CDC7600; FORTRAN IV; SCOPE 2.1; 53,000 (octal) words of small core memory and 65,000 (octal) words of large core memory are necessary for execution.

20414 (ANL/NESC—885R) **SWAAM1; LMFBR sodium-water reaction analysis.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy, J.H.; Valentin, R.A. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048885.

From 8 to 50 elements can be used to represent the single-membrane disk.

SWAAM1 is designed for analysis of the major consequences of large-scale sodium-water reactions in the secondary system of an LMFBR. For a typical system analysis, SWAAM1 treats rapid-transient effects of the order of 1 second or less of real time. The program computes coupled transient events in the shell-side sodium, the tube-side water/steam systems, and the reaction-bubble zone resulting from tube failures.IBM370,3033; FORTRAN IV; OS/370 (IBM370), OS/3033 (IBM3033); 950K bytes of memory are required for execution.

20415 (ANL/NESC—904R) SUPERENERGY2; steady-state LMFBR core analysis. Basehore, K.L. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048904.

SUPERENERGY2 is applicable only to LMFBR assemblies in the steady-state forced convection flow regime.

SUPERENERGY2 was written to perform steady-state, thermal-hydraulic design and performance analyses on multiple LMFBR assemblies. The code automatically generates the geometry and nodes for any number of single- or double-ducted assembly types based on a few critical dimensions. Radial node options are either a standard fine-mesh subchannel layout based on the number of fuel pins or a lumped representation of one to eight rings formed at the user's request. Assemblies may be coupled for interassembly heat transfer effects, using either a conduction or flow solution in the interassembly gap. Generalized boundary conditions can be applied to the noncoupled bundle faces, and a duct wall gamma heating option is available. The code contains default sodium and stainless steel property correlations; mixing parameter flowsplit, and heat transfer correlations; all can be overriden by input data. The calculated bundle temperature profiles are printed in map form at specified locations for ease of use. SUPERENERGY2 can compute problems ranging from a single bundle operating condition parametric study to a large core sector problem determining the effect of interassembly heat transfer on the duct temperature profile for core restraint analysis.CDC7600,CYBER175; FORTRAN IV; SCOPE 2.1, NOS 1.3; Storage requirements vary with problem size. For the given dimensions 53K words of small core memory (SCM) and 66K of large core memory (LCM) are required. The program can also be executed entirely in SCM. If this is the case 155,000 (octal) words of memory are required. The auxiliary program CONVERT requires 21,000 (octal) words of memory for execution.

20416 (ARSD-SP—029) Doppler and sodium void worth effect on the progression of an HCDA LOF event in CRBRP heterogeneous core. Switick, D.M.; Rhow, S.K.; McElroy, J.L. (General Electric Co., Sunnyvale, CA (USA). Advanced Reactor Systems Dept.). 1982. Contract AM03-76SF00893. 7p. (CONF-821103—85). NTIS, PC A02/MF A01. Order Number DE83005223.

From American Nuclear Society winter meeting; Washington, DC, USA (14 Nov 1982).

The CRBRP has adopted a heterogeneous core design where some blanket assemblies (referred to as the internal blanket assemblies) are interspersed with driver fuel assemblies. the heterogeneous core has a low sodium void worth relative to a homogeneous core which was previously considered in the design. Furthermore, the heterogeneous core has a significant share of the Doppler and sodium void worth distributed in the internal blanket assemblies. This paper discusses the impact of such heterogeneous core characteristics on the progression of a hypothetical, unprotected (without scram) LOF event.

20417 (CNEN-RT/ING—82-5) Analysis of characteristic curves of the PC.1 and PC.2 centrifugal pumps of the CPC-1 system. Manca, O. (Comitato Nazionale per l'Energia Nucleare, Rome (Italy)). Jan 1982. 18p. (In Italian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83900867.

An analysis is made of characteristic curves relative to single function of pumps and to a parallel function as obtained from test data. Graphic data are given for water pumps and pumps transporting sodium. 4 references, 7 diagrams.

20418 (CONF-820465—2) Seventeen years of LMFBR experience: Experimental Breeder Reactor II (EBR-II). Perry, W.H.; Lentz, G.L.; Richardson, W.J.; Wolz, G.C. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 17p. NTIS, PC A02/MF A01. Order Number DE83007671.

From American Power conference on nuclear regulation-future directions; Chicago, IL, USA (26 Apr 1982).

Operating experience at EBR-II over the past 17 years has shown that a sodium-cooled pool-type reactor can be safely and efficiently operated and maintained. The reactor has performed predictably and benignly during normal operation and during both unplanned and planned plant upsets. The duplex-tube evaporators and superheaters have never experienced a sodium/water leak, and the rest of the steam-generating system has operated without incident. There has been no noticeable degradation of the heat transfer efficiency of the evaporators and superheaters, except for the one superheater replaced in 1981. There has been no need to perform any chemical cleaning of steam-system components.

20419 (CONF-820628—21) Kinetics of radiation-induced segregation in ternary alloys. Lam, N.Q.; Kumar, A.; Wiedersich, H. (Argonne National Lab., IL (USA); Missouri Univ., Rolla (USA). Dept. of Nuclear Engineering). 1982. Contract W-31-109-ENG-38. 24p. NTIS, PC A02/MF A01. Order Number DE83007741.

From 11. international symposium on effects of radiation on materials, American Society for Testing and Materials; Scottsdale, AZ, USA (28 Jun 1982).

Model calculations of radiation-induced segregation in ternary alloys have been performed, using a simple theory. The theoretical model describes the coupling between the fluxes of radiation-induced defects and alloying elements in an alloy A-B-C by partitioning the defect fluxes into those occurring via A-, B-, and C-atoms, and the atom fluxes into those taking place via vacancies and interstitials. The defect and atom fluxes can be expressed in terms of concentrations and concentration gradients of all the species present. With reasonable simplifications, the radiation-induced segregation problem can be cast into a system of four coupled partial-differential equations, which can be solved numerically for appropriate initial and boundary conditions. Model calculations have been performed for ternary solid solutions intended to be representative of Fe-Cr-Ni and Ni-Al-Si alloys under various irradiation conditions. The dependence of segregation on both the alloy properties and the irradiation variables, e.g., temperature and displacement rate, was calculated. The sample calculations are in good qualitative agreement with the general trends of radiation-induced segregation observed experimentally.

20420 (CONF-821103—84) Intrinsic reactivity feedback characteristics for safety analysis of heterogeneous and homogeneous LMFBR core designs. Doncals, R.A.; Lake, J.A. (Westinghouse Electric Corp., Madison, PA (USA). Advanced Reactors Div.). 1982. Contract AC15-76CL50003. 3p. NTIS, PC A02/MF A01. Order Number DE83007257.

From American Nuclear Society winter meeting; Washington, DC, USA (14 Nov 1982).

This paper presents a comparison of the intrinsic reactivity feedback characteristics of homogeneous and heterogeneous LMFBR designs. The comparisons are shown for a 1000 MWth LMFBR core design. However, the applicability of the conclusions drawn from these comparisons are generic to larger LMFBRs. Consistent sodium void worth distributions have been calculated for heterogeneous and homogeneous 1000 MWth LMFBR core designs. The basic calculations were performed with three dimensional models using ENDF/B-III cross section data and first order perturbation theory.

20421 (CONF-821119—12) Diversion analysis and safeguards measures for liquid-metal fast-breeder reactors. Paper IAEA-SM-260/6. Persiani, P.J.; Ermakov, S.V. (Argonne National Lab., IL (USA); International Atomic Energy Agency, Vienna (Austria)). 1982. Contract W-31-109-ENG-38. 19p. NTIS, PC A02. Order Number DE83007734.

From International symposium on recent advances in nuclear materials safeguards; Nienna, Australia (8 Nov 1982).

The objective of the study is to perform a diversion analysis and an assessment of the available safeguards methods and systems for verifying inventory and flow of nuclear material in accessible and inaccessible areas of liquid-metal fast breeder reactor, LMFBR, systems. The study focuses primarily on the assembly-handling operations, assembly storage facilities, and reactor operations facilities relating to experimental, demonstration and prototypal reactor plants. The safeguards systems and methods presented are considered to be feasible for development and implementation within the resource limitation of the IAEA and are considered to be consistent with the objectives, requirements, and constraints of the IAEA documents INFCIRC/153 and INFCIRC/66-Rev-2.

20422 (DOE/ET/37227—5) **Surface radiation properties of ThO_2 and other reactor materials.** Chan, S.H.; Ma, H.H. (Wisconsin Univ., Milwaukee (USA). Dept. of Mechanical Engineering). Dec 1979. Contract AC02-76ET37227. 106p. NTIS, PC A06. Order Number DE82013559.

This technical report summarizes the results obtained on surface radiation properties of ThO_2 and other related reactor materials. Specifically, the present study provides surface radiation properties of three nuclear reactor materials; thorium dioxide, sodium and steel (99 Fe + 1 C). First, based on transmission spectra and Kramers-Kronig analysis, the complex refractive index, which is fundamental to surface radiation property calculations, of ThO_2 is presented over a wide spectral range. Then depending on the contacting media, three types of the surface are considered. They are the interfaces between ThO_2 and Sodium, ThO_2 and Steel (99 Fe + 1 C) as well as ThO_2 and a gas. For each interface, the spectral interface reflectance from one side of the medium to the other side is evaluated for all wavelengths.

20423 (DOE/ET/37240—94) **Coolant mixing in LMFBR rod bundles and outlet plenum mixing transients. Progress report, September 1, 1981-November 30, 1981.** Todreas, N.E. (Massachusetts Inst. of Tech., Cambridge (USA). Dept. of Nuclear Engineering). Jan 1982. Contract AC02-76ET37240. 39p. NTIS, PC A03/MF A01. Order Number DE83007498.

Information is presented concerning coolant mixing in bundle geometry for wrapped and base rods and models for mixed convection subchannel velocity fields in rod bundles.

20424 (DOE/ET/37240—97TR) **Wire-wrapped rod-bundle heat-transfer analysis for LMFBR.** Wong, C.N.C.; Todreas, N.E. (Massachusetts Inst. of Tech., Cambridge (USA). Dept. of Nuclear Engineering). Jul 1982. Contract AC02-76ET37240. 259p. NTIS, PC A12/MF A01. Order Number DE83007502.

Helical wire wraps are widely used in the LMFBR fuel and blanket assemblies to provide coolant mixing and maintain proper spacing between fuel pins. The presence of the helical wire, however, may possibly induce heat transfer problems, such as the uncertainty of the maximum clad temperature as a result of the contact between the wires and the pins. In this study, the detailed transient three dimensional velocity and temperature distributions for the coolant around the pin will be determined by solving the governing momentum and energy equation numerically. A computer code HEATRAN has been developed to perform this calculation. Before the computer code HEATRAN is applied to the wire wrapped rod bundle problem, it is used to analyze a wide range of fluid and heat transfer problem to verify its capabilities.

20425 (DOE/ET/37240—99) **Coolant mixing in LMFBR rod bundles and outlet-plenum mixing transients. Progress report, March 1, 1982-May 31, 1982.** Todreas, N.E. (Massachusetts Inst. of Tech., Cambridge (USA). Dept. of Nuclear Engineering). Dec 1982. Contract AC02-76ET37240. 74p. NTIS, PC A04/MF A01. Order Number DE83007497.

Information is presented concerning fluid mixing in bundle geometry of wrapped and base rods and criteria for the onset of mixed convection in vertical rod bundles.

20426 (GAO/EMD—82-123) **Questions regarding Clinch River Breeder Reactor project funding and costs.** (General Accounting Office, Washington, DC (USA)). 1982. 5p. General Accounting Office, P.O. Box 6015, Gaithersburg, MD.

Additional information is presented concerning the funding and costs related to the Clinch River Breeder Reactor.

20427 (GAO/EMD—82-128) **Information on the cost of plutonium needed to operate the Clinch River Breeder Reactor for its 5-year demonstration.** (General Accounting Office, Washington, DC (USA). Energy and Minerals Div.). 17 Sep 1982. 6p. General Accounting Office, P.O. Box 6015, Gaithersburg, MD.

Requested information is presented concerning the background on the CRBR Project and its plutonium requirements, and analysis of sources and cost of acquiring plutonium for CRBR fuel.

20428 (GAO/EMD—82-131) **Interim report on GAO's review of the total cost estimate for the Clinch River Breeder Reactor project .** (General Accounting Office, Washington, DC (USA). Energy and Minerals Div.). 23 Sep 1982. 14p. General Accounting Office, P.O. Box 6015, Gaithersburg, MD 20760.

The following sctions discuss (1) the process used by the DOE to estimate CRBR project costs; (2) the inflation allowance used in DOE's cost estimate, which could overstate CRBR costs; (3) the cost of plutonium, revenue projections, and contingency allowances, which may understate the total cost estimate; and (4) several items which are not included in the cost estimate but which, in our view, either will or could result in cost to the Government.

20429 (LA—9630-PR) **Examination of fast-reactor fuels and FBR analytical quality-assurance standards and methods. Progress report, July 1-September 30, 1982.** Maraman, W.J. (comp.). (Los Alamos National Lab., NM (USA)). Jan 1983. Contract W-7405-ENG-36. 10p. NTIS, PC A02/MF A01. Order Number DE83008360.

This is the thirty-second quarterly report of the Examination of Fast Reactor Fuels and Fast Breeder Reactor (FBR) Analytical Quality-Assurance Standards and Methods at the Los Alamos National Laboratory. Information is presented concerning equipment development; analytical chemistry; requests from DRRT; and quality assurance.

20430 (NUREG/CP—0034-Vol.1, pp 1-19) **Physics assessments of LMFBR integral parameters.** Lineberry, M.J.; McFarlane, H.F.; Collins, P.J. (Argonne National Lab., Idaho Falls, ID). Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

Recent progress in assessing the status of measurement and analysis of key fast reactor integral parameters is reviews. The relationship between the parametrs (^{238}U capture, fission rates, sodium-void reactivity Doppler reactivity coefficient, small sample reactivity, and criticality) and typical design and safety parameters in LMFBRs is explained. Major discrepancies between calculations with ENDF/B-Version IV data and the criticl experiments are examined, and recent progress in resolution of some long-standing discrepancies is presented.

20431 (NUREG/CP—0034-Vol.1, pp 20-35) **Sodium-cooled fast reactor thermal-hydraulics.** Todreas, N.E. (Massachusetts Inst. of Tech., Cambridge). Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

The thermal-hydraulics of LMFBR core performance under nominal and operational transient conditions are reviewed. Two predominant flow regimes are identified - forced convection and mixed convection. It is concluded that forced convection behavior is relatively well-predicted although improvements in the prediction of temperatures of irradiated ducts and of severly distorted bundles are needed. Mixed convection behavior has not yet been well studied. Methods to predict the onset of mixed convection, turbulence and recirculation are needed.

20432 (NUREG/CP—0034-Vol.1, pp 78-92) **Sodium-void reactivity in LMFBRs: a physics assessment.** Beck, C.L.; Lineberry, M.J.; McFarlane, H.F.; Olsen, D.N. (Argonne National Lab., Idaho Falls, ID). Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

An extensive recalculation of sodium-void measurements from the US critical experiment program has been completed. Three-dimensional diffusion-perturbation methods and ENDF/B-Version IV data in 28 groups were used throughout this study. The results of the calculations establish the degree of confidence in the prediction of sodium-void worths in typical LMFBR environments, and further demonstrate the usefulness of a two-componet fitting process for biasing calculations in order to produce better predictions of void worths. Measurements in ninety-five zones wre analyzed, resulting in a mean C/E (calculation/experiment) ratio of 1.12 +- 0.20 before fitting, and 0.99 +- 0.09 after fitting. Bias factors for both leakage and non-leakage components were in the range 0.85 to 0.92 for a variety of design parameter variations, i.e. a number of different subsets of the data base. These results may be used to extrapolate from the critical assembly data to general LMFBR application and to estimate the uncertainty of the predicted values.

20433 (NUREG/CP—0034-Vol.1, pp 93-107) **Calculated and measured reactivities in the U9 critical assemblies.** Schaefer, R.W.; Bucher, R.G. (Argonne National Lab., IL). Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

A set of three benchmark fast critical assemblies, designated U9, had a 9% enriched uranium core composition and three degrees of cell heterogeneity. An extensive series of reactivity experiments was performed in U9, which was aimed at diagnosing the bias between measurement and calculation. Both the measurement and calculation techniques include substantial modifications of the standard ANL methods. The experiments clearly show a trend of increasing calculational error with increasing cell heterogeneity using conventional analysis, and the effectiveness of an adjoint correction in removing this trend. The ratio of calculated to measured worth (C/E) for small material samples near the core center is near unity for most samples. Perturbations of the normal core environment, caused by the measurement technique, are shown to affect sample worth C/E's by only about 1%. An alternative determination of fuel worth, largely independent of the small sample approach, also has a C/E near unity. These U9 results are a major contribution to a database for reevaluating the longstanding central worth discrepancy.

20434 (NUREG/CP—0034-Vol.1, pp 118-132) **Extrapolation of small sample Doppler reactivity measurements.** Kaiser, R.E.; Harper, H.A.; Beck, C.L.; Carpenter, S.G. (Argonne National Lab., Idaho Falls, ID). Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

An application of ^{238}U small sample Doppler measurements to the confirmation of LMFBR design calculations is proposed. The method uses the Doppler measurements in conjunction with $^{238}\mathrm{U}(n,\gamma)$ data to predict the radial behavior of the Doppler reactivity C/E, and includes a description of azimuthal variations by using the measured values to normalize a calculated map. The result is a spatial map which can be used, along with data from the SEFOR experiments, to test design level calculations of Doppler reactivity.

20435 (NUREG/CP—0034-Vol.1, pp 133-147) **Assessment of physical characteristics of heterogeneous configurations with variable fertile volume.** Scholtyssek, W. (Kernforschungszentrum, Karlsruhe, Germany); Daguzan, G.; Humbert, G.; Martini, M.; Ruelle, B.; Kappler, F.; Norvez, G. Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

The RACINE program is presented. This program is made in the framework of the collaboration of CEA-ENEA-DEBENE and is devoted to the study of the physics aspects of heterogeneous cores on the basis of a parametric approach (fertile amount, fertile ring position, thickness etc). Experimental results are presented, together with the analysis performed both with CEA and DEBENE methods.

20436 (NUREG/CP—0034-Vol.1, pp 177-193) **Validation of alternative methods and data for a benchmark fast reactor depletion calculation.** Toppel, B.J.; Adams, C.H.; Lawrence, R.D.; Henryson, H. II; Derstine, K.L. (Argonne National Lab., IL). Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

Alternative neutronics models, data processing procedurs, and data bases have been used to examine two 383.5 day burn cycles for a 1000 MWe heterogeneous LMFBR design developed by the Large Core Code Evaluation Working Group (LCCEWG). the diffusion theory neutronics methods used are finite difference, nodal, and spatial flux synthesis. Four, eight, and twenty-group multigroup corss sections based on ENDF/B-IV and ENDF/B-V data bases are compared. The effect of parked control rods as compared with rods moving during the burn cycles is examined. Various performance parameters are compared including burnup reactivity swings, rod worths, fuel burnup, power splits, and sodium void reactivity effects. The sensitivity of the results to choices in the modeling process are discussed.

20437 (NUREG/CP—0034-Vol.1, pp 194-208) **Determination of the core power distribution in the Clinch River Breeder Reactor.** Lake, J.A.; Varner, S.K.; Rittenberger, R.V. (Westinhouse Electric Corp., Madison, PA). Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

The fuel and blanket assembly layout in the CRBRP heterogeneous core is designed to produce a radially flat power distribution which maximizes the total core power with respect to peak linear power limits. The core power distribution is the basis for the demonstration of power-to-melt margins, the determination of flow orificing requirements, and the prediction of temperature and irradiation conditions which are the driving functions behind the fuel and blanket lifetime evaluations. The few-group, diffusion-theory based design methdology and the ENDF/B cross section data are challenged by the unique characteristics and sensitivities of the heterogeneous CRBRP core arrangement. Consequently, an extensive critical experiments program has been performed at ZPPR to assess design bias factors and uncertainties in key integral physics parameters. These parameters include the reactor critical eigenvalue, control rod worth characteristics, isotopic fission and capture rate distributions and gamma heating as they are influenced by fuel/blanket interfaces, core burnup, blanket plutonium accumulation, etc., and core safety characteristics like the sodium void worth distribution. The results of the analyses of these experiments reflect deficiencies in cross section data, cross section processing and/or reactor calculational methodology approximations.

20438 (NUREG/CP—0034-Vol.1, pp 254-270) **Analysis of neutronic space-time effects in large LMFBR's with thermal-hydraulic feedback using FX2-TH nuclear reactor kinetics code and mode expansion of the neutron flux shape function.** Yarlagadda, B.S. (Argonne National Lab., IL). Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

For a delayed critical transient in an LMFBR, the dependence of the local flux tilt on the degree of heterogeneity in the core configuration was examined. Using a mode expansion of te neutron flux shape function, decoupling the resulting mode kinetics equations and utilizing the prompt jump approximation, an expression for the i th harmonic local flux tilt was developed. According to this expression, the i th harmonic local flux tilt tau/sub i/(r Vector, t) is inversely proportional to the sum of the eigenvalue separation between the i th harmonic and the fundamental mode and the delayed neutron fraction and is directly proportional to a time dependent factor T/sub i/(t) and a space dependent factor G/sub i/(r Vector). The modified eigenvalue separation and G/sub i/(r Vector) are known when the eigenvalues and eigenfunctions of the unperturbed reactor are available. Thus if t/sub i/(t), which depends upon the perturbation, varies little in comparison with the modified eigenvalue separation from one core configuration to another, a simple measure of the i th harmonic local flux tilt is feasible. This flatness criterion for t/sub i/(t) has been investigated by inserting 2 cents/sec ramp reactivity in three core configurations. During the transient, the shape function was calculated with the FX2-Th code and tau/sub i/(r Vector,t) and T/sub i/(t) were extracted using mode expansion of the shape function. The results of this analysis are presented.

20439 (NUREG/CP—0034-Vol.1, pp 406-423) **Validation studies of the ENDF/MC^2-2/SDX.** McKnight, R.D.; Hwang, R.N.; Stenberg, C.G.; Blomquist, R.N. (Argonne National Lab., IL). Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

An extensive validation study of the ENDF/MC^2-2/SDX cell homogenization path has been made. The validation procedure has relied on the availability of rigorous Monte Carlo results obtained with the VIM code. The current study has investigated three ZPR benchmark assemblies with rather diverse characteristics. The calculations have included homogeneous zero-leakage cells, critically-buckled heterogeneous cells, and full as-built critical assemblies. This study has identified and eliminated several limitations and inconsistencies in these anlaytical methods and their application. The deterministic methods and Monte Carlo have been shown to agree very well (i.e., generally within 1 σ uncertainties) for zero-buckled homogeneous and heterogeneous cell calculations. For the high-buckling cases, ther was a bias on leakage-related parameters for both the homogeneous and heterogeneous cell calculations. This bias - less leakage with MC^2-2/SDC relative to VIM - was consistent with the results observed in the full assembly calculations. MC^2-2/SDX eigenvalues for the three ZPR assemblies were 0.5 to 0.7% σ k high relative to VIM. Principal cross sections and neutron spectrum in the full assembly calculations were in good agreement between these methods.

20440 **Corrosion-resistant fuel cladding allow for liquid metal fast breeder reactors.** Brehm, W.F.; Colburn, R.P. (to Dept. of Energy). US Patent 4,362,696. 7 Dec 1982. Filed date 21 May 1979. vp.

PAT-APPL-041273.

An aluminide coating for a fuel cladding tube for LMFBRS (liquid metal fast breeder reactors) such as those using liquid sodium as a heat transfer agent. The coating comprises a mixture of nickelaluminum intermetallic phases and presents good corrosion resistance to liquid sodium at temperatures up to 700° C while additionally presenting a barrier to outward diffusion of 54mn.

20441 **HEDL shielded materials facility remote examination of breeder reactor fuel pins.** Daubert, R.L.; Berger, J.D.; Weber, J.W. (Westinghouse Hanford Company, P.O. Box 1970, Richland, WA 99352). *Transactions of the American Nuclear Society;* **41**: 640-641(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

20442 **Sensitivities and uncertainties of a large LMFBR using the adjusted cross-section library ORACLE-1.** Marable, J.H.; Biswas, D.; Cowan, C.L.; Kalifelz, J.M.; Weisbin, C.R.; White, J.R. (Oak Ridge National Laboratory, Oak Ridge, TN 37830). *Transactions of the American Nuclear Society;* **41**: 578-579(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

20443 **LMFBR core design for low capital cost and low sodium void.** Fischer, G.J. (Brookhaven National Laboratory, Upton, NY 11973). *Transactions of the American Nuclear Society;* **41**: 136-137(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

20444 **Examination of bimetallic Inconel 600/316 stainless steel sodium-heated steam generator.** DeVan, J.H.; Goodwin, G.M.; Leslie, B.C.; Slaughter, G.M. (Oak Ridge National Laboratory, Oak Ridge, TN 37830). *Transactions of the American Nuclear Society;* **41**: 299-300(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

20445 **Combination pipe-rupture mitigator and in-vessel core catcher.** Tilbrook, R.W.; Markowski, F.J. US Patent A 6-356,569. 9 Mar 1982. 17p. Contract AC15-76CL02395.

A device is described which mitigates against the effects of a failed coolant loop in a nuclear reactor by restricting the outflow of coolant from the reactor through the failed loop and by retaining any particulated debris from a molten core which may result from coolant loss or other cause. The device reduces the reverse pressure drop through the failed loop by limiting the access of coolant in the reactor to the inlet of the failed loop. The device also spreads any particulated core debris over a large area to promote cooling.

2106 Power Reactors, Auxiliary, Mobile, Package, And Transportable

20446 (AD-A—115232/1) **Electron dose attenuation kernels for slab and spherical geometries. Final report.** Jordan, T.M. (Experimental and Mathematical Physics Consultants, Santa Monica, CA (USA)). Nov 1981. 120p. NTIS, PC A06/MF A01.

Dose attenuation kernels are given for fission spectrum electrons in aluminum shields with slab and spherical geometries. Sectoring methods used for satellites and space vehicles are discussed and several mathematical relationships are summarized. Dose attenuation data for monoenergetic electrons are presented for several shield materials and geometrics.

20447 (LA—9598-PR) **Space reactors. Progress report, October 1981-March 1982.** Ranken, W.A. (comp.). (Los Alamos National Lab., NM (USA)). Jan 1983. Contract W-7405-ENG-36. 79p. NTIS, PC A05/MF A01. Order Number DE83008278.

Progress in design studies and technology for the SP-100 Project - successor to the Space Power Advanced Reactor (SPAR) Project - is reported for the period October 1, 1981 to March 31, 1982. The basis for selecting a high-temperature, UO_2-fueled, heat-pipe-cooled reactor with a thermoelectric conversion system as the 100-kW/sub e/ reference design has been reviewed. Although no change has been made in the general concept, design studies have been done to investigate various reactor/conversion system coupling methods and core design modifications. Thermal and mechanical finite element modeling and three-dimensional Monte Carlo analysis of a core with individual finned fuel elements are reported. Studies of unrestrained fuel irradiation data are discussed that are relevant both to the core modeling work and to the design and fabrication of the first in-pile irradiation test, which is also reported. Work on lithium-filled core heat pipe development is described, including the attainment of 15.6 kW/sub t/ operation at 1525 K for a 2-m-long heat pipe with a 15.7-mm outside diameter. The successful operation of a 5.5-m-long, lightweight potassium/titanium heat pipe at 760 K is described, and test results of a thermoelectric module with GaP-modified SiGe thermoelectric elements are presented.

20448 (LA-UR—83-449) **Space nuclear power and man's extraterrestrial civilization.** Angelo, J.J.; Buden, D. (Los Alamos National Lab., NM (USA); Florida Inst. of Tech., Melbourne (USA)). 1983. Contract W-7405-ENG-36. 24p. (CONF-830421—1). NTIS, PC A02/MF A01. Order Number DE83007561.

From 20. space congress; Cocoa Beach, FL, USA (26 Apr 1983).

This paper examines leading space nuclear power technology candidates. Particular emphasis is given the heat-pipe reactor technology currently under development at the Los Alamos National Laboratory. This program is aimed at developing a 10-100 kWe, 7-year lifetime space nuclear power plant. As the demand for space-based power reaches megawatt levels, other nuclear reactor designs including: solid core, fluidized bed, and gaseous core, are considered.

2107 Regulation And Licensing

REFER ALSO TO CITATION(S) 20405, 20695, 20696

20449 **(CONF-820619—2) Importance of loss-of-benefits considerations in nuclear regulatory decision-making.** Buehring, W.A.; Peerenboom, J.P. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 13p. NTIS, PC A02/MF A01. Order Number DE83007613.

From 9. annual engineering conference on reliability; Hershey, PA, USA (16 Jun 1982).

This paper identifies and discusses some of the important consequences of nuclear power plant unavailability, and quantifies a number of technical measures of loss of benefits that may help the Nuclear Regulatory Commission make decisions involving nuclear power plant licensing and operation. The loss-of-benefits analysis presented here is based on the results of a series of case studies developed by Argonne National Laboratory in cooperation with four electric utilities on hypothetical nuclear plant shutdowns.

20450 **(NUREG—0020-Vol.6-No.10) Licensed operating reactors. Status summary report.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Resource Management). Oct 1982. 408p. NTIS, PC A18/MF A01 - GPO. Order Number DE83901522.

The US Nuclear Regulatory Commission's monthly LICENSED OPERATING REACTORS Status Summary Report provides data on the operation of nuclear units as timely and accurately as possible. This report is divided into three sections: the first contains monthly highlights and statistics for commercial operating units, and errata from previously reported data; the second is a compilation of detailed information on each unit, provided by NRC Regional Offices, IE Headquarters and the Utilities; and the third section is an appendix for miscellaneous information such as spent fuel storage capability, reactor years of experience and non-power reactors in the United States.

20451 **(NUREG—0304-V7-N1) Regulatory and technical reports: compilation for first quarter 1982, January-March.** Savolainen, A. (Nuclear Regulatory Commission, Washington, DC (USA)). May 1982. 144p. NTIS, PC A07/MF A01.

This compilation consists of bibliographic data and abstracts for the formal regulatory and technical reports issued by the U.S. Nuclear Regulatory Commission (NRC) Staff and its contractors. It is NRC's intention to publish this compilation quarterly and to cumulate it annually.

20452 **(NUREG—0485-Vol.5-No.1) Systematic evaluation program. Status summary report.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Resource Management). 31 Jan 1983. 64p. NTIS, PC A04/MF A01 - GPO. Order Number DE83901535.

Status summaries concerning legal aspects of the reactors are presented for Dresden-1 reactor, Dresden-2 reactor, Big Rock Point reactor, Ginna-1 reactor, Connecticut Yankee reactor, LACBWR reactor, Millstone-1 reactor, Oyster Creek-1 reactor, Palisades-1 reactor, San Onofore-1 reactor, and Rowe Yankee reactor.

20453 **(NUREG—0540-N2) Title list of documents made publicly available: documents from October through December 1978 for Dockets 50-334 through STN 50-597.** (Nuclear Regulatory Commission, Washington, DC (USA)). Jun 1982. 406p. NTIS, PC A18/MF A01.

This document contains a description of information received and generated by the U.S. NRC. This special edition contains Docket 50 material from 1978 that has not appeared in previous editions of the Title List. The documents in this supplement are indexed by personal author, corporate source, and report number.

20454 **(NUREG—0540-Vol.4-No.11) Title list of documents made publicly available.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Administration). Feb 1983. 669p. NTIS, PC A99/MF A01 - GPO. Order Number DE83901541.

The Title List of Documents Made Publicly Available is a monthly publication. It contains descriptions of the information received and generated by the US Nuclear Regulatory Commission (NRC). This information includes (1) docketed material associated with civilian nuclear power plants and other uses of radioactive materials and (2) nondocketed material received and generated by NRC pertinent to its role as a regulatory agency. As used here, docketed does not refer to Court dockets; it refers to the system by which NRC maintains its regulatory records. This series of documents is indexed by a Personal Author Index, a Corporate Source Index, and a Report Number Index.

20455 **(NUREG—0566-Vol.2-No.4) Standards development status summary report. Quarterly report covering two periods July-December 1982.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Regulatory Research). 1982. 1982p. NTIS, PC A09/MF A01 - GPO. Order Number DE83901520.

This report gives in summary form, the current schedule plans for development of regulations, guides, reports, petitions and environmental statements. Approved schedules are identified by a T (target) date below each milestone description on the computerized network. Schedule estimates that have not yet been approved by res management are also included and are identified by an E (estimate) dated below the approved target date. E dates do not represent approved changes and are printed for information purposes only.

20456 **(NUREG—0748-V2-N3) Operating reactors licensing actions summary.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Management and Program Analysis). Apr 1982. 368p. NTIS, PC A16/MF A01.

The Operating Reactors Licensing Actions Summary is designed to provide the management of the Nuclear Regulatory Commission (NRC) with an overview of licensing actions dealing with operating power and nonpower reactors.

20457 **(NUREG—0748-Vol.2-No.12) Operating reactors licensing actions summary.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Resource Management). Jan 1983. 290p. NTIS, PC A13/MF A01 - GPO. Order Number DE83901271.

The operating reactors licensing actions summary is designed to provide the management of the Nuclear Regulatory Commission (NRC) with an overview of licensing actions dealing with operating power and nonpower reactors. These reports utilize data collected from the Division of Licensing in the Office of Nuclear Reactor Regulation and are prepared by the Office of Management and Program Analysis. This summary report is published primarily for internal NRC use in managing the operating reactors licensing actions program. Its content will change based on NRC management informational requirements.

20458 **(NUREG—0748-Vol.3-No.1) Operating reactors licensing actions summary.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Resource Management). Feb 1983. 293p. NTIS, PC A13/MF A01 - GPO. Order Number DE83901513.

The operating reactors licensing actions summary is designed to provide the management of the Nuclear Regulatory Commission (NRC) with an overview of licensing actions dealing with operating power and nonpower reactors. These reports utilize data collected from the division of licensing in the Office of Nuclear Reactor Regulation and are prepared by the Office of Management and Program Analysis. This summary report is published primarily for internal NRC use in managing the operating reactors licensing actions program. Its content will change based on NRC management informational requirements.

20459 (NUREG—0750-V14-IND-1) **Indexes to Nuclear Regulatory Commission Issuances, July-September 1981.** (Nuclear Regulatory Commission, Washington, DC (USA)). 1981. 65p. NTIS, PC A04/MF A01.

Digests and indexes for issuances of the Commission (CLI), the Atomic Safety and Licensing Appeal Panel (ALAB), the Atomic Safety and Licensing Board Panel (LBP), the Administrative Law Judge (ALJ), the Directors' Decisions (DD), and the Denials of Petitions of Rulemaking are presented in this document. These digests and indexes are intended to serve as a guide to the issuances.

20460 (NUREG—0750-V15-N1) **Nuclear Regulatory Commission Issuances, January 1982.** (Nuclear Regulatory Commission, Washington, DC (USA)). 1982. 234p. NTIS, PC A11/MF A01.

This report includes the issuances received during the specified period from the Commission (CLI), the Atomic Safety and Licensing Appeal Boards (ALAB), the Atomic Safety and Licensing Boards (LBP), the Administrative Law Judge (ALJ), the Director's Decisions (DD), and the Denials of Petitions for Rulemaking (DPRM).

20461 (NUREG—0750-V15-N2) **Nuclear Regulatory Commission Issuances, February 1982.** (Nuclear Regulatory Commission, Washington, DC (USA)). 1982. 143p. NTIS, PC A07/MF A01.

This report includes the issuances received during the specified period from the Commission (CLI), the Atomic Safety and Licensing Appeal Boards (ALAB), the Atomic Safety and Licensing Boards (LBP), the Administrative Law Judge (ALJ), the Directors' Decisions (DD), and the Denials of Petitions for Rulemaking (DPRM).

20462 (NUREG—0849) **Standard review plan for the review and evaluation of emergency plans for research and test reactors. Technical report.** Bates, E.F.; Grimes, B.K.; Ramos, S.L. (Nuclear Regulatory Commission, Washington, DC (USA). Office of Inspection and Enforcement). May 1982. 36p. NTIS, PC A03/MF A01.

This document provides a Standard Review Plan for the guidance of the NRC staff to assure that complete and uniform reviews are made of research and test reactor emergency plans. The report is organized under ten planning standards which correspond to the guidance criteria in Draft II of ANSI/ANS 15.16 as endorsed by Revision 1 to Regulatory Guide 2.6. The applicability of the items under each planning standard is indicated by subdivisions of the steady state thermal power levels at which the reactors are licensed to operate. Standard emergency classes and example action levels for research and test reactors which should initiate these classes are given in an Appendix.

20463 (NUREG/CR—2000-Vol.2-No.1) **Licensee Event Report (LER) compilation for month of January 1983.** (Oak Ridge National Lab., TN (USA)). Feb 1983. Contract W-7405-ENG-26. 116p. (ORNL/NSIC—200-Vol.2-No.1). NTIS, PC A06/MF A01 - GPO. Order Number DE83007893.

This monthly report contains Licensee Event Report (LER) operational information that was processed into the LER data file of the Nuclear Safety Information Center (NSIC) during the one month period identified on the cover of the document. The LERs, from which this information is derived, are submitted to the Nuclear Regulatory Commission (NRC) by nuclear power plant licensees in accordance with federal regulations. Procedures for LER reporting are described in detail in NRC Regulatory Guide 1.16 and NUREG-0161, Instructions for Preparation of Data Entry Sheets for Licensee Event Reports. The LER summaries in this report are arranged alphabetically by facility name and then chronologically by event date for each facility. Component, system, and keyword indexes follow the summaries.

20464 (ORNL/SUB—7846/4) **Study of a conceptual nuclear energy center at Green River, Utah: institutional and licensing issues.** Heilman, C.B.; Herman, A.A. Jr.; Vito, D.J. (Gilbert Associates, Inc., Reading, PA (USA)). Apr 1982. Contract W-7405-ENG-26. 85p. (GAI—05-1155-000). NTIS, PC A05/MF A01. Order Number DE83006837.

This document constitutes a segment of a feasibility study investigating the ramification of construcing a nuclear energy center in an arid western region. In this phase of the study, the institutional and licensing issues impacting a NEC were analyzed. The most prominent issue facing such a concept is the ownership form of NEC. In addition, legislation and regulation also have a substantial impact regardless of the ownership format.

2108 Economics

REFER ALSO TO CITATION(S) 20410, 20817

20465 (AD-A—118807/7) **Uncertainty in estimating power-plant closure costs: A review of 'Economic impact of closing Zion nuclear facility,' a report by the Comptroller General of the United States.** Stucker, J.P. (RAND Corp., Santa Monica, CA (USA)). Mar 1982. 43p. NTIS, PC A03/MF A01.

Comparing GAO's estimates of the costs that could result from the closure of Zion and Indian Point reveals the large range of uncertainty currently associated with such estimates and suggests a number of areas requiring further study. Better and more detailed information on alternative generating costs, decommissioning costs, incremental financing costs, and secondary costs in general needs to be developed and documented. And the groups or institutions who will ultimately bear these costs need to be identified. Uncertainties in all these areas must be reduced, and common costing methods and assumptions adopted, before intelligent decisions can be made regarding the future of any of the nuclear generating facilities (either operational or under construction) that are currently being questioned.

20466 (ANL/NESC—146) **NPRFCCP; fuel cycle costs performance data.** Tyson, F.D. (United Engineers and Constructors, Philadelphia, PA (USA). Technical Computer Services). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048146.

Nuclear fuel cycle costs in dollars per year ($/yr), and in mills per kilowatt-hour (mills/kwhr) are computed and tabulated for each region of a multiregion reactor core, on the basis of AEC-leased nuclear fuel material and of privately-owned nuclear fuel material. Fuel cycle costs are computed separately for each region or zone, for core designs of any configuration or combination of material depletion or enriched uranium fuel or other special nuclear material. Printed output of the program includes (a) detailed fuel cycle costs for each zone in tabular form, for AEC-leased and privately-owned nuclear fuel material, respectively, (b) a summary tabulation of nuclear fuel costs for all regions of the complete core, including fixed charges on working capital required for core fabrication and for nuclear fuel material, (c) a summary tabulation of certain computed performance and economic data, viz., average residence time, annual fuel throughput, unit electrical energy yield, annual power generation, and core fabrication costs, and (d) a tabulation of all input data for all regions. The printing of data described in (a) and (d) above is optional with program use.CDC6600;IBM360,370/195; FORTRAN IV; SCOPE 3.3 (CDC6600), OS/360,370 (IBM360,370).

20467 (ANL/NESC—221) **RELOAD FEVER; one-dimensional, few-group diffusion depletion.** Wang, C.L. (Institute of Nuclear Energy Research, Lung-Tan (Taiwan)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048221.

Maxima of - 4 energy groups 100 mesh points 20 diffusion regions 32 subregions 35 nuclides per subregion 60 cross section sets; Source deck (4724 cards) Sample problem (231 cards) Sample problem output (46 selected pages, complete on 1 microfiche) Reference report, GA-6612.

RELOAD FEVER performs a few-group, one-dimensional depletion calculation which allows fuel in various stages of irradiation to be homogenized into the same region for purposes of the diffusion calculation but follows the depletion of each of the subregions separately. The calculation may be interrupted periodically for refueling one or more regions. Recycling is optional, and an unlimited number of refuelings may be performed. A control poison search is available, and concentration-dependent self-shielding factors may be applied to one lumped poison.CDC CYBER73,175; FORTRAN IV; NOS/BE 1.2, 1.3; 67,000 (octal) words of memory are required for execution.

20468 (ANL/NESC—224) **WAMPUM; fuel cycle costs performance study.** Tyson, F.D. (United Engineers and Constructors, Philadelphia, PA (USA). Technical Computer Services). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048224.

This program calculates fuel cycle costs on a detailed basis, using results of nuclear depletion calculations and certain specified economics assumptions. The purpose is to provide a measure of performance for comparing or optimizing fuel cycles and associated reactor core and fuel element characteristics.CDC6600; FORTRAN IV; SCOPE 3.3.

20469 (ANL/NESC—226) **OPUS; power plant performance and price study.** Gratteau, J.E. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048226.

Power levels from 100 to 1000 megawatts are acceptable. A maximum of 100 turbogenerator arrangements can be included. Systems up to 100 nodes leading to no more than 749 equations can be studied .

The code generates a flow network equivalent to a gas-cooled nuclear power plant of specified electrical output (in the range of 100 to 1000 MW) according to input data and programmed rules, proceeds to evaluate the plant performance and price of the turbogenerator set (according to General Electric price data), and prints as a result a coded list of all plant components and a detailed performance map.UNIVAC1108; FORTRAN IV; EXEC2; 32K machine with 5 tapes besides input and output tapes.

20470 (ANL/NESC—302) **GAFFE; equilibrium fuel cycle calculation.** Jaye, S. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048302.

Maxima of - 18 energy groups 50 total nuclides 3 nuclides with full transfer matrix.

A zero-dimensional calculation of feed fuel requirements is performed to produce a specified end of cycle multiplication factor for the equilibrium fuel cycle, given feed composition, length of cycle and reactor power. It is alternately possible to compute cycle length or feed enrichment. The code is a survey tool which assumes periodic refueling and permits complete or partial recycling of materials. The segregated fuel concept can be handled within the framework of the calculation.UNIVAC1108; FORTRAN IV; EXEC2, GAX27; 65K memory and 2 tapes (I/O).

20471 (ANL/NESC—340) **POWERCO; nuclear station electricity costs.** Tyson, F.D. (United Engineers and Constructors, Philadelphia, PA (USA). Technical Computer Services). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048340.

Maximum of - 180 time periods.

POWERCO calculates the cost of electricity produced by nuclear power stations, assuming all cash expenses such as investment and fuel costs, operating expenses, and taxes are known. The power cost is held constant throughout the project life.CDC6600; FORTRAN IV; SCOPE 3.3.

20472 (ANL/NESC—354) **CINCAS; nuclear fuel cycle cost and economics.** McLain, S.; Fulford, P.J. (Purdue Univ., Lafayette, IN (USA); Michigan Univ., Ann Arbor (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048354.

Government ownership or leasing of fuel is not allowed, and Th233 fuels are not covered, nor has consideration been given to breeder reactors. The in-core time spanned by all batches of a case must be no more than 40 years.

CINCAS is a nuclear fuel cycle cost code which may be used for either engineering economy predictions of fuel cycle costs or for accounting forecasting of such costs. Features of CINCAS include - (1) monthly calculation of dollar costs and mass inventory on a batch and case basis for each month of a period which is usually defined as (but not restricted to) beginning with the delivery of fuel to the reactor site and ending with the withdrawal of fuel from the reactor. (2) a general formula for the unit price of enriched uranium which allows for variable feed and tails enrichments, costs of feed, chemical conversion, separative work, and losses in conversion and fabrication.IBM360;CDC6600; FORTRAN IV; OS/360 and SCOPE.

20473 (ANL/NESC—441) **PWCOST; reactor fuel cycle cost calculation.** Lee, D.H. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048441.

Maxima of - 24 core regions 100 segments 2 fuel particle types 100 reloads before equilibrium is established 100 times for core reload.

PWCOST is used to calculate nuclear reactor fuel cycle costs. Input for all components of the fuel cycle are time-dependent. Working capital charge rates may be specified separately for in-core and out-of-core time periods.UNIVAC1108; FORTRAN IV; EXEC2; 65K core and 1 tape.

20474 (ANL/NESC—498) **CONCEPT5;CONCEPT3; power plant conceptual cost estimate.** Hudson, C.R.II; Bowers, H.I. (Oak Ridge National Lab., TN (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048498.

The CONCEPT computer code system was developed to provide conceptual capital cost estimates for nuclear-fueled and fossil-fired power plants. Cost estimates can be made as a function of plant type, size, location, and date of initial operation. The output includes a detailed breakdown of the estimate into direct and indirect costs similar to the accounting system described in document NUS-531. Cost models are provided in CONCEPT5, the fifth generation in the development of the CONCEPT package, for single- and multi-unit pressurized water reactors, boiling water reactors, and coal-fired plants with and without flue gas desulfurization equipment. The CONCEPT5 models are updated models of those available in CONCEPT3 and, in addition, this edition contains historical factory equipment cost data for the generation of cost indices and escalation rates; indirect costs are calculated as a function of unit size rather than a function of direct costs; and an indirect cost account for owner's costs and an improved time-dependent escalation feature are included. The CONCEPT3 models and cost data are outdated; the package is being retained in the library since it is the only UNIVAC1108 machine version of CONCEPT available and could prove helpful in converting the latest IBM release.IBM360,370;UNIVAC1108; FORTRAN IV (H) (98%) and Assembly language (2%) (IBM360); FORTRAN IV (UNIVAC1108); OS/360 (IBM360) and EXEC8 (UNIVAC1108); Less than 270K bytes, four scratch files, two support files, and the standard I/O units are required for CONCEPT5; 150K bytes, one scratch disk or tape, two support tapes, and the standard I/O units are needed for CONCEPT3.

20475 **(ANL/NESC—540) PACTOLUS;CLOTHO; nuclear power plant cost code.** Haffner, D.R. (Hanford Engineering Development Lab., Richland, WA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048540.

Maxima of - 40 annual time periods into which all costs and mass flows are accumulated 20 isotopic mass flows charged into and discharged from the reactor model.

PACTOLUS is a code for computing nuclear power costs using the discounted cash flow method. The cash flows are generated from input unit costs, time schedules and burnup data. CLOTHO calculates and communicates to PACTOLUS mass flow data to match a specified load factor history.UNIVAC1108; FORTRAN V; CSCX; 65K memory with drum storage of input data to speed up processing.

20476 **(ANL/NESC—855) REFCO8; discounted cash flow fuel cycle cost.** Salmon, R. (Oak Ridge National Lab., TN (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048855.

REFCO8 is designed to calculate nuclear fuel cycle cost by the discounted cash flow method for any given capital structure and interest rates. REFCO uses continuous discounting so that each expenditure or income is discounted from the time of occurrence, and fuel cycle costs are calculated for each batch of fuel both individually and cumulatively through each batch. Tax deductible fuel expense can be calculated on a batchwise basis in keeping with industry practice. REFCO8 also has provision for parametic studies of the effect of price escalation, and can be used to calculate the equilibrium fuel cycle cost of a reactor by supplying input data for a single equilibrium batch.IBM360,370; FORTRAN IV; OS/360 (IBM360), OS/370 (IBM370); The program requires approximately 155K bytes of memory for execution.

20477 **(CONF-8208117—1) Loss of benefits resulting from mandated nuclear plant shutdowns.** Peerenboom, J.P.; Buehring, W.A. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 20p. NTIS, PC A02/MF A01. Order Number DE83007737.

From Conference on generation planning: modeling and decisionmaking; Chattanooga, TN, USA (10 Aug 1982).

This paper identifies and discusses some of the important consequences of nuclear power plant unavailability, and quantifies a number of technical measures of loss of benefits that result from regulatory actions such as licensing delays and mandated nuclear plant outages. The loss of benefits that accompany such regulatory actions include increased costs of systems generation, increased demand for nonnuclear and often scarce fuels, and reduced system reliability. This paper is based on a series of case studies, supplemented by sensitivity studies, on hypothetical nuclear plant shutdowns. These studies were developed by Argonne in cooperation with four electric utilities.

20478 **(NUREG/CR—2704) U.S. reactor spent-fuel storage capabilities. Technical report.** Lee, W.J.; Hoffman, C.C.; Caviness, C.K. (Nuclear Assurance Corp., Atlanta, GA (USA)). Jun 1982. 76p. NTIS, PC A05/MF A01.

This report describes the spent-fuel storage situation at reactors in the United States. The focus of the report is on the reactors that are developing a spent-fuel storage problem and the alternatives the utilities are utilizing and planning to use to minimize the problem. The alternatives the utilities are using and/or considering are described in the report and include: High-density storage racks; Double-tiered storage racks; Rod consolidation; Dry storage systems; Fuel transshipments; and At-reactor storage pools. All of these alternatives are not available to every reactor and utility that is faced with a spent-fuel storage problem. Generally, utilities are reracking or are planning to rerack those spent-fuel pools that can be reracked with higher-density racks or double-tiered racks. Where reracking is not feasible, then fuel transshipments are being performed or considered. Since none of these other alternatives have been fully approved and licensed, these alternatives are all being evaluated.

2109 Process Heat Reactors

REFER ALSO TO CITATION(S) 20395, 20397, 20400, 20688

20479 **(BGI/GCRA—83-001) Monolithic HTGR - reformer design and cost summary: thermochemical pipeline application.** (Bechtel Group, Inc., San Francisco, CA (USA)). Dec 1982. Contract AC03-78SF02034. 59p. NTIS, PC A04/MF A01. Order Number DE83007130.

This summary report updates conceptual designs and cost estimates for monolithic High Temperature Gas-Cooled Reactor (HTGR) plants used as a source of process heat. The GFY 82 studies summarized in this report address design improvements and cost reductions for High Temperature Process Heat Systems selected in GFY 81. The GFY 81 studies consisted primarily of evaluating various configurations for a single (monolithic) HTGR rated at 1170 MWt used as part of a Thermochemical Pipeline (TCP) System. In the TCP concept, a helium-heated reformer produces syngas which can be transported up to 100 miles via pipeline to a methanation plant, where it is converted to methane. This exothermic process generates high-temperature steam for nearby process steam users. The methane is then returned to the nuclear plant site for conversion to syngas in the reformers. The work performed in GFY 82 on the monolithic HTGR-R plants is described. The results of the cost improvement studies are reviewed. A cost evaluation of the HTGR-R plants incorporating the GFY 82 changes is included. Recommendations for follow-on work on the HTGR-R monolithic plants are provided.

20480 **(BGI/GCRA—83-002) Modular HTGR systems design and cost summary.** (Bechtel Group, Inc., San Francisco, CA (USA)). Dec 1982. Contract AC03-78SF02034. 104p. NTIS, PC A06/MF A01. Order Number DE83007137.

This summary report describes conceptual designs and cost estimates for High Temperature Gas-Cooled Reactor (HTGR) plants based on the modular reactor concept as a source of process steam. Studies suggest that a modular reactor system (MRS) composed of a number of small, standardized, HTGR modules (which collectively meet the process heat users' requirements) might have some advantages relative to a single, large (monolithic) HTGR designed for the same capacity. This summarizes the designs of these MRS systems. The overall plant descriptions, arrangements, and layouts of the MRS-R and MRS-SC/C concepts are summarized. This inlcudes descriptions of the reactor core design and internals, major components, and balance of plant (BOP) design. Initial availability estimates as well as licensing and safety assessments of these MRS concepts are presented. Estimates of the plant capital, fuel cycle, operating and maintenance costs, and construction schedule are summarized. The technical issues which need be addressed for the development of the MRS concepts are highlighted. A discussion of the anticipated follow-on effort to these studies is presented.

20481 **(DOE/SF/02034—T81) FY1983 HTGR summary level program plan.** (Gas-Cooled Reactor Associates, La Jolla, CA (USA)). 1 Feb 1983. Contract AC03-78SF02034. 105p. NTIS, PC A06/MF A01. Order Number DE83007138.

The major focus and priority of the FY1983 HTGR Program is the development of the HTGR-SC/C Lead Project through one of the candidate lead utilities. Accordingly, high priority will be given to work described in WBS 04 for site and user specific studies toward the development of the Lead Project. Asessment of advanced HTGR systems will continue during FY1983 in accordance with the High Temperature Process Heat (HTPH) Concept Evaluation Plan. Within the context of that plan, the assessment of the monolithic HTPH concepts has been essentially completed in FY1982 and FY1983 activities and will be limited to documentation only. the major advanced HTGR systems efforts in FY1983 will be focused on the further definition of the Modular Reactor Systems concepts in both the reforming (MRS-R) and

Steam Cycle/Cogeneration 9MRS-SC/C) configurations in WBS 41. The effort will concentrate upon key technical issues and trade studies oriented to reduction in expected cost and schedule duration. With regard to the latter, the most significant will be trade study addressing the degree of modularization of reactor plant structures. particular attention will be given to the confinement building which currently defines the critical path for construction.

20482 **(GA/PC—000007) HTGR steam-cycle/cogeneration technology development plan for Nuclear Steam Supply System. Volume III. Technology development plan.** (General Atomic Co., San Diego, CA (USA)). Jul 1982. Contract AT03-76ET35300;AT03-76ET35301. 418p. NTIS, PC A18/MF A01. Order Number DE83008103.

The program described in this document includes all work currently foreseen by the program participants as needed to provide the basic technology and design data required on a priority basis to complete and verify the design of the HTGT - steam cycle/cogeneration (SC/C) plant operating on the low-enriched uranium/thorium (LEU/Th) cycle in a time frame consistent with specific HTGR plant applications. The program includes fuel materials and fuel process development, all nuclear steam supply system (NSSS) component testing and design verification, plant technology development, materials design data development, and technology transfer from other programs required to support the design of the nuclear heat source (NHS)

20483 **(GA/PC—000008) HTGR Steam Cycle/Cogeneration Design Development Plan for Nuclear Steam Supply System. Volume II. Design development plan.** (General Atomic Co., San Diego, CA (USA)). Jul 1982. Contract AT03-76SF70046. 377p. NTIS, PC A17/MF A01. Order Number DE83008102.

The Design Development Program plan described in this document is a part of the overall program being undertaken by the Department of Energy (DOE), utilities, and industry to realize national benefits from the deployment of the high-temperature gas-cooled reactor (HTGR) utilized as the nuclear steam supply system (NSSS) for a 2240-MW(t) HTGR - steam cycle/cogeneration (HTGR-SC/C) plant. This document covers the work associated with the design of the NSSS of the HTGR-SC/C. Information is presented concerning the work breakdown structure, document tree, and design phase definitions used by GA in defining and breaking down the work to be accomplished; the constraints and assumptions which are the basis for this plan; the priority technical issues associated with the HTGR-SC/C and the plan for resolving these issues; the design data needs (DDN's) which serve as the link between the Design Development Program plan and the Technology Development Program plan; the design work to be accomplished to bring the HTGR-SC/C to reality; the project management and support effort required to plan, organize, direct, and control the program; and the program costs and schedules.

20484 **(GA/PC—000040) HTGR steam-cycle/cogeneration lead plant design and cost report. Volume II. Nuclear Steam Supply System.** (General Atomic Co., San Diego, CA (USA)). Jul 1982. Contract AC03-78SF02034. 308p. NTIS, PC A14/MF A01. Order Number DE83008100.

This document is Volume II of the three-volume HTGR-SC/C Design and Cost Report, which is, in turn, a part of the Lead Plant Project Decision Package. Itprovides a design description and estimated cost of the nuclear steam supply system (NSSS) for the 2240-MW(t) high-temperature gas-cooled reactor steam cycle/cogeneration (HTGR-SC/C plant. The NSSS is designed to supply high-temperature, high-pressure steam for cogeneration of electric power and process plant usage. It encompasses the reactor heat source, the primary and auxil;iary heat removal systems, the steam generation portion of the secondary coolant system, and related controls, instrumentation, and support equipment.

20485 **(GCRA—82-010-Vol.1) High-temperature gas-cooled reactor steam-cycle/cogeneration lead plant design and cost report. Volume I: summary.** (Gas-Cooled Reactor Associates, La Jolla, CA (USA)). Jul 1982. Contract AC03-78SF02034. 95p. NTIS, PC A05/MF A01. Order Number DE83008021.

Two Lead Plant options have been developed that use a 2240 MWt HTGR Nuclear Steam Supply System: an electric generation plant that produces a net output of 855 MWe, and a cogeneration plant that produces a variable output of process steam and electricity. This document is Volume I of the Lead Plant Design and Cost Report which prvides the current design and cost status of the 2240 MWt high temperature gas-cooled reactor steam cycle/cogeneration (HTGR-SC/C) Lead Plant. A summary status is presented for the Lead Plant conceptual design and costs. The two Lead Plant options are described. A summary of the engineering, capital and operating costs is presented. The costs for an equilibrium plant (nth plant-of-a-kind) of the same configuration as the Lead Plant are also given. The HTGR-SC/C plant costs are then compared with costs for equivalent sized PWR and coal plants. The PWR and coal plant costs were developed using the same basis and methods as used for the HTGR-SC/C estimates. The Lead Plant design and construction schedules are summarized.

20486 **(GCRA—82-011) High-temperature gas-cooled reactor steam cycle/cogeneration. Design and technology development plan for Nuclear Steam Supply System. Volume I: Summary.** (Gas-Cooled Reactor Associates, La Jolla, CA (USA)). Jul 1982. Contract AC03-78SF02034. 97p. NTIS, PC A05/MF A01. Order Number DE83008101.

The HTGR-SC/C Lead Project is proposed as a joint Industry/Government venture for the development and construction of an HTGR-SC/C Lead Plant. The Design and Technology Development Plan is presented in three volumes of which this document is Volume I, Summary. Section 2 of this document presents the basis for the remaining development work in terms of the evolution in requirements imposed by the User, Regulator and Vendor institutions since the Fort St. Vrain demonstration plant was committed. Development costs amounting to an estimated $483M are discussed in context with the effort to: design and document the NSSS of a commercial HTGR-SC/C system; verify component and system performance through hardware tests; and extend the base of technology for fuel, materials and analytical methods to establish industry capability and standards to design the system. Section 3 summarizes the detailed requirements, workscope, cost and schedule information in Volume II, The Design Development Plan; and in Volume III, The Technology Development Plan.

20487 **(GCRA—82-012) High Temperature Gas-Cooled Reactor Steam Cycle/Cogeneration Lead Project Decision Package: executive summary.** (Gas-Cooled Reactor Associates, La Jolla, CA (USA)). Jul 1982. Contract AC03-78SF02034. 24p. NTIS, PC A02/MF A01. Order Number DE83008104.

The Lead Project Decision Package is a series of documents that support the bases for a 2240 MW(t) High-Temperature Gas-Cooled Reactor Steam Cycle/Cogeneration (HTGR-SC/C) Lead Project. In particular, the Design and Cost Report and the Design and Technology Development Plan constitute the technical and economic data base for such a Project. As such, the information contained in these documents represents the collective views and efforts of the HTGR Program participants that has been developed primarily through contracts with the Department of Energy. The Lead Project Strategy Plan was prepared by Gas-Cooled Reactor Associates with cooperation from the industrial Program Participants as a proposed strategy for deploying such a Project, including proposed cost and risk sharing arrangements between the private and public sectors. The objective of the Lead Project Decision Package is to establish a framework and data base for the considerations of and the negotiations between the prospective participants in the Land Project.

20488 **(GCRA—82-014) High-temperature gas-cooled reactor steam-cycle/cogeneration lead project: national incentives.** (Gas-Cooled Reactor Associates, La Jolla, CA (USA)). Jul 1982. Contract AC03-78SF02034. 15p. NTIS, PC A02/MF A01. Order Number DE83007986.

In order to secure the HTGR as a commercial option, a National Program is required that is based on equitable cost and risk sharing arrangements between the private and public sectors and focused on a specific project. Through a comprehensive evaluation of project candidates, the four-loop, 2240 MW(t) HTGR-Steam Cycle/Cogeneration (SC/C) system has been established as the primary candidate as a Lead Project. This document reviews the National Incentives as posed by the Utility/User industry through Gas-Cooled Reactor Associates (GCRA) for commercializing the HTGR through the Steam Cycle/Cogeneration Lead Project. Following this introduction, subsequent brief summaries will review: HTGR features and evolution potential; US energy growth trends and implications; cogeneration opportunities and economics; safety and investment protection; environment, operations and maintenance considerations; and fuel cycle considerations.

20489 (GCRA—82-015) Industrial process-heat market assessment: an update. (Gas-Cooled Reactor Associates, La Jolla, CA (USA)). Sep 1982. Contract AC03-78SF02034. 148p. NTIS, PC A07/MF A01. Order Number DE83007993.

This report is designed to be a reference resource and is an update of the report, same subject, issued by GCRA in December 1981. It gives a broad perspective of the potential HTGR market for industrial process heat and is intended to serve as a briefing document for those wishing to obtain background information or to serve as a starting point from which more detailed and refined studies may be undertaken. This report presents a qualitative and quantitative description of the industrial process heat market in the US, provides a summary discussion of cogeneration experience to date, and outlines the existing institutional and financial framework for cogeneration. The report presents the latest developments in regulatory and legislative activities which are associated with that technology. Finally, the report presents a brief discussion of an advanced process heat distribution system, coupled with an HTGR configuration which has been under study during the current fiscal year by one of the program participants.

20490 (GCRA/UEC—82-010) High-temperature gas-cooled reactor steam-cycle/cogeneration, lead plant design and cost report. Volume III. Balance of plant. (United Engineers and Constructors, Inc., Philadelphia, PA (USA)). Jul 1982. Contract AC03-78SF02034. 665p. NTIS, PC A99/MF A01. Order Number DE83008265.

The purpose of this volume is to describe the balance of plant (BOP) design, cost and schedule for the 2240 MW(t) HTGR-SC/C Cogeneration and Electric Generation Plants. Summary plant descriptions for the cogeneration and electrical plants are provided. The differences between the two plants are discussed. The capital costs and engineering and construction milestone schedules respectively for both the lead or first-of-a-kind and the equilibrium or Nth-of-a-kind plants are described. A presentation of the assumptions and basis for these costs and schedules is included. Costs for comparable PWR and coal plants are provided for comparison with the HTGR costs.

22 NUCLEAR REACTOR TECHNOLOGY

2201 Theory And Calculation

REFER ALSO TO CITATION(S) 20420, 22738

20491 (ANL/NESC—43R) CURFIT; curve fitting experimental data points. Warrington, J.A. (Knolls Atomic Power Lab., Schenectady, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048043.

CURFIT is a composite program for fitting experimental data points with different types of common analytic curves. There are at present five fits available: (1) polynomial y = summation over i of a(i)*(x**(i)) (2) exponential y = a*exp(bx) (3) cosine y = a*cos(b(x+c)) (4) series of cubics y = a(j)+b(j)*x+c(j)*(x**2)+d(j)*(x**3) (5) Fourier seriesCDC6600; FORTRAN IV and ASCENT; SCOPE 2.0.

20492 (ANL/NESC—121) AIREK3; space-independent kinetics with feedback. Grosskopf, O.G.P. (South African Atomic Energy Board, Pretoria). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048121.

AIREK3 finds the numerical solution to the space-independent reactor kinetics equations based on the method developed by E. R. Cohen. Input and output are simplified and the power, inverse period, feedbacks, and precursors are displayed graphically.IBM360; FORTRAN IV; OS/360.

20493 (ANL/NESC—136) HERESY3; two-dimensional heterogeneous reactor calculation. Finch, D.R. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048136.

Maxima of - 50 flux/geometry symmetry positions 20 physically different assemblies 9 resonance levels 5000 rod coordinate positions.

HERESY3 solves the two-dimensional, few-group, static reactor eigenvalue problem using the heterogeneous (source-sink or Feinburg-Galanin) formalism. The solution yields the reactor k-effective and absorption reaction rates for each rod normalized to the most absorptive rod in the thermal level. Epithermal fissions are allowed at each resonance level, and lattice-averaged values of thermal utilization, resonance escape probability, thermal and resonance eta values, and the fast fission factor are calculated. Kernels in the calculation are based on age-diffusion theory. Both finite reactor lattices and infinitely repeating reactor supercells may be calculated. Rod parameters may be calculated by several internal options, and a direct interface is provided to a HAMMER system (NESC Abstract 277) lattice library tape to obtain cell parameters. Criticality searches are provided on thermal utilization, thermal eta, and axial leakage buckling.IBM360; FORTRAN IV and BAL; OS/360; 45K single-precision words of high speed core plus 50K single-precision words of disk (or drum) storage.

20494 (ANL/NESC—167) FLARE; three-dimensional reactivity and power distribution. Delp, D.L Fisher, D.L. (General Electric Co., San Jose, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048167.

Because of the independent representation of the control rods, a three-dimensional calculational scheme was employed. This three-dimensional geometry combined with computer size limitations restricted the calculations to a relatively coarse mesh. The present version of the code will handle a maximum array of 14 x 14 x 12 nodes with either mirror or diagonal symmetry .

FLARE is an inexpensive calculational method to determine core reactivity and core power distribution. A scoping calculation of this type is valuable in appraising the physics characteristics of planned test modes of operation so that detailed analysis can be reserved for those core calculations of greater interest from either a technician or safety standpoint.GE635;IBM360;CDC7600; FORTRAN IV; GECOS (GE635), OS/360 (IBM360), and SCOPE (CDC7600); 39K and 3 tapes in addition to the system units are used on the GE635, 400K and 5 tapes or disks are required on the IBM360. 80,000 (octal) words of small core memory and 12,000 (octal) words of large core memory are needed for the CDC7600 version.

20495 (ANL/NESC—168) INVERSE KINETICS;r102; space-independent inverse kinetics calculations. Kaganove, J.J. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048168.

Maxima of - 50 delay groups 1000 data points 99 data blocks (A data block is a sequence of input points characterized by a fixed time-interval between points, a smoothing option, and a number of repetitions of the smoothing option.).

Given the space-independent, one energy group reactor kinetics equations and the initial conditions, this program determines the time variation of reactivity required to produce the given input of flux-time data.IBM360; FORTRAN IV; OS/360.

20496 **(ANL/NESC—174) FORE2; fast reactor excursion calculations.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Butz, H.R. (General Electric Co., Sunnyvale, CA (USA). Advanced Products Operation). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048174.

Reactor excursions which can be calculated are restricted to those transients in which the reactor is not substantially destroyed. As a general rule, changes in reactor geometry and composition during an excursion are limited to those cases in which the reactivity effects of the changes may be considered as small perturbations of the initial system. Thus, accidents involving large-scale disassembly and bulk meltdown of a core are not covered by FORE2. FORE2 is valid only while the core retains its initial geometry .

FORE2 is a coupled thermal hydraulics-point kinetics digital computer code designed to calculate significant reactor parameters under steady-state conditions, or as functions of time during transients. The transients may result from a programmed reactivity insertion or a power change. Variable inlet coolant flow rate and temperature are considered. The code calculates the reactor power, the individual reactivity feedbacks, and the temperature of coolant, cladding, fuel, structure, and additional material for up to seven axial positions in three channel types which represent radial zones of the reactor. The heat of fusion, accompanying fuel melting, the liquid metal voiding reactivity, and the spatial and the time variation of the fuel cladding gap coefficient due to changes in gap size are considered.GE635;IBM360; FORTRAN IV; GECOS (GE635), OS/360 (IBM360); 3 files and 40K memory (GE635).

20497 **(ANL/NESC—184) BRT1; thermal spectrum cross section calculations.** Bennett, C.L.; Purcell, W.L. (Pacific Northwest Lab., Richland, WA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048184.

BRT1, like the original THERMOS code developed by H. Honeck of Brookhaven National Laboratory, computes the scalar thermal neutron spectrum as a function of position in a lattice by solving the integral transport equation with isotropic scattering. One-dimensional slab or cylindrical geometry may be used. As output the code supplies flux-averaged values of sigma a, sigma f, nu sigma f, sigma s, and d for the cell composition and the values of sigma a, sigma f, nu sigma f, sigma s, and sigma tr for the isotopic constituents.UNIVAC1108; FORTRAN V; CSCX; 64K memory, input, output, program, library, and punch units plus 3 scratch units or equivalent drum storage.

20498 **(ANL/NESC—196) CURIE; fission product inventory decay history.** Klickman, A.E.; Froehle, P.H. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048196.

Maxima of - 20 decay times 10 elements for which fission product histories are printed.

CURIE calculates the fission product inventory decay history for fuel that has been in operation for a specified duration. The inventory decay history is provided for specified nuclides and elements, as well as the total fission products.IBM370; FORTRAN IV; OS/370; 250K bytes of storage are required.

20499 **(ANL/NESC—249) LASER; spectrum calculations with burnup cylindrical lattice.** Carson, C.E. (Tennessee Valley Authority, Chattanooga (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048249.

This version of LASER is restricted to one-dimensional, cylindrical geometry. The maximum number of space points is 14, with a maximum of 5 space points in the fuel region. The code is restricted to 4 mixtures (moderator, non-absorbing heavy scatter, cladding, fuel). The moderator can be either light water (Nelkin or free gas scattering kernel), or heavy water (Nelkin scattering kernel). The cladding material can be stainless steel, aluminum or zircalloy-2. The fuel can be a metal oxide or cermet. The epithermal and fast energy ranges include 50 energy groups. The thermal range includes 35 energy groups. Only the U235 chain (through U236) and the U238 chain (through Pu242) are available in the code. The fission products are separated into Xe135, the directly-produced Sm149, and all other fission products lumped into one pseudo fission product. The cross sections for the lumped fission products are represented by polynomials in the burnup. The spatial distribution of U238 resonance captures within the fuel rods is given as input.

LASER is based on modified versions of the slowing-down program MUFT and the thermalization transport theory program THERMOS, and performs a calculation of the neutron spectrum in a uniform lattice made up of cylindrical rods, cladding, and surrounding moderator. The thermal cutoff in LASER is 1.855 eV. The program performs a burnup calculation for the lattice. The spatial distribution of burnup within the fuel rods is explicitly calculated. The program will, at option, account for all non-linearities and mutual connections in the system of burnup equations. This calculation accounts for the variation of the neutron flux in space and energy during each time-step. A buckling, and a boron poison, criticality search are provided as options. Output includes edits in the energy range 0 to 0.625 eV.IBM360,370; FORTRAN IV; OS/360; 150K with library tape and 2 scratch units.

20500 **(ANL/NESC—255) R101; space-independent kinetics kex options.** Kaganove, J.J. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048255.

R101 solves the space-independent, one-energy group reactor kinetics equations to determine the time variation of neutron density given specified initial conditions. Any of four programmed representations of excess reactivity can be selected.IBM360; FORTRAN IV; OS/360; 240K bytes of storage.

20501 **(ANL/NESC—273) THREDES; one-dimensional few group diffusion design system.** Blaine, R.A. (Atomics International, Canoga Park, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048273.

Maxima of - BAM - 10 regions 100 space points 20 isotopes per region FORM - 18 different isotopes FOG - 4 groups 238 space points KINDLE - 2 groups .

THREDES is a scientific applications programming system. Incorporated in this system are the necessary modules to perform parametric design studies of thermal reactors including the thermal cell homogenization (BAM), the fast spectrum calculation (FORM - NESC Abstract 51), reactor diffusion theory (FOG - NESC Abstract 28), and zero-dimensional burnup (KINDLE) calculations. These modules can be used in conjunction with one another or individually.IBM360; FORTRAN IV; OS/360; 256K bytes.

20502 **(ANL/NESC—277) HAMMER;LITHE;HELP; critical analysis system.** Honeck, H.C. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048277.

Cell calculations - maxima of 30 thermal groups 54 epithermal groups 20 space points 20 regions 18 isotopes 10 mixtures 3 thermal upscattering mixtures 200 resonances per group no overlap or interference single level only Reactor calculations - maxima of 40 regions 40 mixtures 250 space points 4 groups.

HAMMER performs infinite lattice, one-dimensional cell multigroup calculations, followed (optionally) by one-dimensional, few-group, multiregion reactor calculations with neutron balance edits.IBM360; FORTRAN IV and BAL; OS/360; 512K bytes and 10 sequential data sets.

20503 **(ANL/NESC—279) LEOPARD;SPOTS; sjectrum calculation with depletion.** Barry, R.F. (Westinghouse Electric Corp., Pittsburgh, PA (USA). Atomic Power Div.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048279.

LEOPARD works with nuclides commonly used in water reactors. Thorium and U238 fuel chains are allowed.

LEOPARD is a unit cell homogenization and spectrum generation (MUFT-SOFOCATE type) program with a fuel depletion option.IBM360;UNIVAC1108; FORTRAN IV(H) (IBM360) and FORTRAN V (UNIVAC1108); OS/360 (IBM360) and EXEC2 (UNIVAC1108); 50K (decimal) memory.

20504 **(ANL/NESC—290) GASA (GA Stability Analysis); stability analysis for reactor kinetic equations.** Baxter, A. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048290.

GASA determines the stability of any physical system whose motion is describable by a set of first-order linear differential equations. In particular GASA evaluates the stability of a reactor described by the linear reactor kinetics equations with temperature feedback, against perturbations about any operating power level. The program will also calculate and plot the transfer function between any state variable of the system and a given external forcing function (such as an external reactivity perturbation) or another state variable of the system.UNIVAC1108; FORTRAN IV; EXEC2; 64K memory.

20505 **(ANL/NESC—303) BLOOST6; combined kinetics two-dimensional heat transfer.** Merrill, M.H. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048303.

Two-dimensional heat transfer routines are limited to r-z geometry, 36 regions, 19 materials, 15 radial mesh points, 20 axial mesh points, 6 radial region boundaries, 10 axial region boundaries, and inner and outer axial coolants. Kinetics equations allow 6 delayed groups and 2 temperature coefficients. Two types of fuel particles are permitted.

BLOOST6 combines a reactor space-independent kinetics code with a two-dimensional heat transfer code, and a time-dependent spherical geometry heat transfer routine for fuel particles. The code is applicable to problems for which the space-independent form of the reactor kinetics equation is applicable.UNIVAC1108; FORTRAN IV and Assembly language; EXEC2, GAX27; 64K memory with 2 tapes (I/O).

20506 **(ANL/NESC—304) PERT4; two-dimensional perturbation in xy, rz, and r-theta geometry.** Little, W.W. (Pacific Northwest Lab., Richland, WA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048304.

PERT4 will handle up to 26 energy groups with a 50 x 50 spatial mesh.

PERT4 computes reactivity coefficient traverses in x-y, r-z, or r-theta geometry using the first-order perturbation equations in the diffusion approximation. Flux and adjoint input can be taken directly from 2-D calculations or synthesized from radial and axial 1-D calculations. The code can also be used to compute activity traverses for any cross section of any material, the neutron generation time, and the effective delayed neutron fraction.UNIVAC1108; FORTRAN IV; 65K memory.

20507 **(ANL/NESC—307) HWOCR-SAFE; two-dimensional Monte Carlo cell calculation.** Levitt, L.B.; Lewis, R.C. (Atomics International, Canoga Park, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048307.

The HWOCR-SAFE program is a two-dimensional cell code in which the cell is assumed to be rectangular. Up to 20 material regions (zones) can be specified where one of the zones is completely described by the cell boundaries. All other zones are assigned concentric cylinders which lie within a cylinder described as outer wall boundary, or within the right circular cylindrical rods which are inserted in the innermost cylinder designated as the inner wall boundary. Up to 40 rods may be inserted, and 6 types of rod may be specified.

HWOCR-SAFE is a Monte Carlo thermal reactor analysis program designed for use with proposed HWOCR lattice configurations. It is a benchmark tool to check multigroup diffusion and transport calculations and to evaluate the effect of their use of geometric approximations.IBM360; FORTRAN IV (H) and BAL; OS/360.

20508 **(ANL/NESC—309) TSN; spatially-dependent reactor kinetics.** Rhoades, W.A. (Atomics International, Canoga Park, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048309.

The time-dependent neutron transport equation is solved. Energy deposition is allowed to cause variation in the neutron cross sections for the core region, in the core density, and in core height. The result is a kinetics calculation including spatial dependence both in feedback effects and in neutron density. The results are summarized in a manner similar to point-kinetics codes, and spatial distributions are also given. Graphical summaries of the significant variables and spatial distributions are given. In the IBM360 version, either the neutron yield from fission or the thickness of a specified zone can be changed as an independent function of time as specified by the user. This provides two ways of allowing explicit reactivity variation with time.IBM360; FORTRAN IV; OS/360; IBM360 Model 50H or larger.

20509 **(ANL/NESC—311) BURNUP; heavy element isotopic burnup analysis.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; McLaughlin, T.V. (General Electric Co., Pleasanton, CA (USA). Vallecitos Nucleonics Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048311.

A maximum of 50 samples can be run in any one case. Although a single sample can be processed, the averaging procedures for nuclear constants are most effective when 5 to 50 samples from the same fuel load are pooled in a single case .

BURNUP correlates heavy element isotopic analysis with fission product neodymium, uranium, and plutonium concentrations in an irradiated uranium fuel for calculation of burnup (atom per cent fission and MWD/MT). Reactor parameters, including effective neutron absorption cross sections for all uranium and plutonium isotopes, capture-to-fission ratios for U235, Pu239, and Pu241, a two-group description of the neutron spectrum, the average neutron temperature, the reactor fast fission factor, and the distribution of the sources of fission among the fissionable nuclides are computed from the experimental data obtained from the mass spectrometric analysis of uranium, plutonium, and neodymium.GE635; FORTRAN IV; GECOS; 32K memory and an on-line printer.

20510 **(ANL/NESC—313) CINDER;M0102; point depletion fission product.** England, T.R. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048313.

The program is limited to 500 total nuclides formed in up to 240 chains of 20 or fewer nuclides each. Up to 10 nuclides may act as fission product sources, contributing to power, and as many as 99 time-steps of arbitrary length are permitted. All stable nuclides must have a cross section if zero power time-increments are anticipated.

CINDER is a four-group, one-point depletion and fission product program based on the evaluation of a general analytical solution of nuclides coupled in any linear sequence of radioactive decays and neutron absorptions in a specified neutron flux spectrum. The desired depletion and fission product chains and all physical data are specified by the problem originator. The program computes individual nuclide number densities, activities, nine energy-group disintegration rates, and macroscopic and barns/fission poisons at each time-step as well as selected summaries of these data.CDC6600;IBM360; FORTRAN IV (CDC6600), FORTRAN IV and BAL (IBM360).

20511 (ANL/NESC—316) **GAFGAR;p3t;PROC;TAPCOP; spectra and group-averaged cross section calculation.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Wagner, R.M. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048316.

The maximum of 1740 fine groups in the GAF section may be subdivided into 10 or less sets of fine groups having a constant lethargy width. The GAR section requires a uniform spacing between the maximum of 14,700 discrete velocities. The maximum number of nuclides in a problem is 20, and the maximum total number of broad groups (output for nuclear design calculations) is 99 with a maximum of 20 broad groups in the GAR section.

The problem is to obtain very detailed neutron flux and current distributions as functions of energy considering explicitly the possible overlap effects between resonances of a resonance absorber and of mixtures of resonance absorbers and to use these distributions to prepare group-averaged cross sections and transfer arrays for use in fast reactor analyses.UNIVAC1108; FORTRAN IV; EXEC2, GAX33A; 52K of available fast memory and 5 magnetic tape units plus 5 scratch files (drum files are used on the UNIVAC1108) totaling about 600K in capacity.

20512 (ANL/NESC—317) **GAPOTKIN; space-independent reactor kinetics.** Koch, P.K. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048317.

GAPOTKIN will handle up to 20 time zones and will allow for 50 power-dependent or energy-dependent reactivity coefficients per time zone if tables are used. General data are stored for up to 500 time-steps and time delay data are stored for 10,000 time-steps.

GAPOTKIN is a point-kinetics code that solves the space-independent kinetics equations for a very general form of the reactivity function.UNIVAC1108; FORTRAN IV; EXEC2, GAX29; GAPOTKIN requires 4100 storage locations. The data storage requirement is roughly 33,000 locations. Two I/O devices are required for reading and printing and one additional I/O device is necessary if the program is loaded from tape.

20513 (ANL/NESC—326) **AIROS2A; simulation of reactor dynamics.** Nickols, A.N. (Atomics International, Canoga Park, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048326.

Maxima of - 15 delayed neutron precursor groups 400 feedback variables 90 feedback variables printed out Any number of channels and nodes per channel within the limitation above are allowed.; Sourceence reports.

AIROS2A solves the space-independent reactor kinetics equations and provides for the determination of reactivity by solving in addition the discretized equations that represent the spatial heat and mass transfer model for several fuel channels. In addition, variation of the film coefficient with flow is accounted for along with the provision for flow decay and afterglow heating. Scrams can be initiated by delayed signals from instruments that sense any quantity calculated, e.g., power, inverse period or temperature. Generalized feedback equations are used to provide flexibility in the models that represent multichannel heat transfer including conduction and convection, energy, pressure and other phenomenon such as fuel melting, coolant boiling and voiding burn-out. The reactivity equation is also generalized. The reactivity feedback coefficients can be constant or vary as the square root or reciprocal of temperature. Furthermore, any feedback variable can be used to initiate a reactivity scram, each with a unique delay time. An input generator computes the conduction and convection coefficients for an n x m nodal, multichannel system using built-in tables of specific heat, density, conductivity and viscosity for the common fuel, structure and coolant materials, and performs an initial temperature calculation. The film coefficients may be specified or calculated using Lyon's equation or the Dittus-Boelter equation.IBM360; FORTRAN IV (95%) and Assembly language (5%); OS/360; 256K byte IBM360 and an SC-4020 graphical display device.

20514 (ANL/NESC—345) **GAND; GAFGAR cross-section library preparation.** Archibald, R.J.; Mathews, D.R. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048345.

Maxima of - 20 ENDF/B materials processed in a single problem 35 resonance levels on either side of the incident neutron energy.

GAND prepares the cross sections needed for detailed computations of neutron energy spectra in fast reactors from a file of basic nuclear data in the ENDF/B format.UNIVAC1108; FORTRAN IV; EXEC2, GAX35; 52K memory and 4 to 8 magnetic tape units plus 5 scratch files (drum files are used on the UNIVAC1108) totaling about 1310K in capacity.

20515 (ANL/NESC—356) **ZPR-III Assembly 48 GAFGAR ENDF/B Data Tapes; ZPR-III assembly 48 GAFGAR ENDF/B data tapes.** Baxter, A. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048356.

The two GAF tapes have 1038 fine groups starting at a lethargy of -0.4 with a deltau spacing at 0.01 for 960 groups to a lethargy of 9.2 followed by 78 groups with a spacing of 0.1 deltau to a lethargy of 17.0. The GAR tape has 14,457 points starting at 1.237663 times 106 m/s (8.007 keV) with a constant deltav of 85.0 m/s to 8.903 times 103 m/s (0.414 eV).

A benchmark study of ZPR-III Assembly 48 using ENDF/B cross sections was undertaken to identify possible cross section discrepancies in the microscopic ENDF/B data. This work was done for the CSEWG testing subcommittee as part of their Phase I data testing. This package contains the cross section data generated for this study in the form of the ultra-fine group cross sections of the materials of ZPR-III Assembly 48 in the format of the GGA GAF/GAR program data tapes.UNIVAC1108; Variable-length binary records.

20516 (ANL/NESC—363) **BLAST; reactor kinetics temperature distribution study.** Grosskopf, O.G.P. (South African Atomic Energy Board, Pretoria). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048363.

BLAST has been developed to study accident conditions in critical and subcritical thermal multiplying systems. The program computes the time behavior of the thermal neutron density and the system temperature following a step-change in reactivity. The integrated thermal neutron density is also computed, from which the total number of fissions during an excursion may be obtained.IBM360; FORTRAN IV; OS/360; 128K bytes of storage.

20517 (ANL/NESC—392) **RAFFLE; first flight collision probabilities for multiple-cell geometries.** Hermann, O.W.; Carlsmith, R.S. (Oak Ridge National Lab., TN (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048392.

Maxima of - 20 regions 10 different types of rods (differing in either geometry or materials) 50 rods per region 20 subregions per rod 12 regions with rods (only the first 12 regions counting from the cell center) 8 materials.

RAFFLE calculates neutron first-flight collision probabilities for a wide variety of three-dimensional cell geometry configurations. The outer boundaries of the cell cross section may be circular, square, or hexagonal. The cell may contain annular regions and/or clusters of rods.IBM360,370/195; FORTRAN IV and BAL; OS/360,370.

20518 (ANL/NESC—394R) JITER; fluctuation experiment analysis. Natelson, M.; Harris, D.R. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048394.

The kinetics model may have as many as 4 energy groups and up to 6 groups of delayed neutrons. Half the reactor core can be described with up to 300 spatial mesh points and as many as 5 different materials distributed in at most 50 spatial regions. A total of 10 modes can be used in the expansions.

JITER computes the following quantities measured in reactor fluctuation experiments - the dispersion parameter y, the modified coefficient of correlation MCC, the frequency dependent part of the power spectral density PSD, and the cross power spectral density CPSD.CDC6600; FORTRAN IV; 120,000 (octal) memory locations.

20519 (ANL/NESC—400) SAS1A; fast reactor power and flow transients. Heames, T.J. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048400.

Maxima of - 20 axial heat transfer nodes in a fuel pin, in the upper blanket, and in the lower blanket 6 delay groups 60 regions used to describe the core 200 axial segments in the coolant channel 15 radial temperatures in the fuel.

SAS1A is used for the analysis of fast reactor power and flow transients. The program consists of four driver programs each called by the main program. These drivers handle the areas of (1) input/output, with diagnostics, (2) steady-state initialization, to define the core operating conditions before the initiation of the transient, (3) the transient portion, and (4) the disassembly (weak explosion) analysis.CDC6600;IBM360/75; FORTRAN IV; SCOPE (CDC6600) and OS/360 (IBM360); 410K bytes on the IBM360/75 (without overlays) and approximately 300K bytes on the IBM360/75 (with overlays).

20520 (ANL/NESC--415) CEXE;INCEXE; one-group, three-dimensional xyz xenon oscillation. Kern, R. (Combustion Engineering, Inc., Windsor, CT (USA). Computer Services Section). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048415.

Maximum reactor core size representation is restricted to a nodal configuration of 19 x 19 x 10 in the x, y, z directions, respectively.

CEXE solves the three-dimensional xyz time-dependent xenon spatial oscillation problem using a modified one energy group theory and a nodal representation.IBM360; FORTRAN IV; OS/360; 256K bytes, 6 IBM2314 disk drives, and 3 IBM2400 tape drives.

20521 (ANL/NESC—420) GROUSE; space-dependent cross section generation. Henderson, W.B. (Westinghouse Electric Corp., Pittsburgh, PA (USA). PWR Systems Div.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048420.

Maxima of - 99 groups 40 core zones 20 parametric values of core absorption cross section 3 parametric values of scattering cross section 25 isotopes 2600 fine energy lattice points The core can contain a mixture of isotopes if the isotopic composition is not a function of position.

GROUSE computes effective multigroup cross sections as a function of position in the core of a reactor or the absorber region of a fuel or control element. The flux weighting uses synthesized fluxes generated in fine energy detail from parametric flux traverses supplied as input as a function of the core absorption and scatter cross sections.GE625,635; FORTRAN IV; GECOS; 38K memory, 6 tapes or disk.

20522 (ANL/NESC—423) DOS; neutron flux-dosimeter activity relation. Henderson, W.B. (Westinghouse Electric Corp., Pittsburgh, PA (USA). PWR Systems Div.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048423.

DOS computes the local neutron flux per reference reactor power level which will produce the measured activity of a dosimeter. Alternatively, if the flux value is supplied, the corresponding dosimeter activity will be calculated.GE625,635; FORTRAN IV; GECOS III; 25K memory.

20523 (ANL/NESC—425R) REDUX; reactor fluctuation experiment analysis. Harris, D.R.; Natelson, M. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048425.

REDUX is used for the reduction of data from reactor fluctuation experiments. From input count samples recorded by one or two counting channels, the program computes unbiased sample estimates of moments and functions of moments of the count distributions, including the dispersion parameter y and the modified coefficient of correlation MCC. Standard error estimates are computed for y and MCC.CDC6600; FORTRAN IV; SCOPE; 64,000 (octal) locations.

20524 (ANL/NESC—427) FARED; one-dimensional fast reactor design & survey study. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Livolsi, A.Z. [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048427.

Maxima of - 100 microgroups 30 multigroups 15 downscattering groups 150 mesh points 149 mesh intervals 149 mesh intervals per zone 50 unique nuclides 20 zones 20 blocks 100 zone materials 40 cells 30 nuclides per block 20 zones per block 2 cells per block 30 nuclides in a chain 500 resonance peaks per nuclide 15 nuclides per cell composition 30 nuclides per block composition 7 resonance nuclides per block 3000 storage locations for bulk material data.

FARED contains an internal cross section averaging routine which is responsible for preparing broad group cross section sets for various material regions of the reactor. The cross section averaging is performed in program REGA, which computes a B1 flux and current in up to 20 reactor block compositions for use as weighting functions in the cross section collapsing calculation. A homogeneous or heterogeneous resolved and unresolved resonance treatment is provided to compute effective microgroup resonance cross sections for the block mixture or up to 2 cell types per block. Real and adjoint flux distributions are calculated for one-dimensional slab, cylindrical, or spherical geometries. The real fluxes are normalized to yield desired total reactor power. Criticality searches may be performed on the reactor dimension, transverse buckling or zone compositions. Enrichment searches may be performed to yield desired ratios of maximum (or average) power densities in several zones. Zonewise depletion is calculated either for a given time period or until specified criticality, burnup or nuclide concentrations are satisfied. Flexible fuel management is available permitting specified material units to be moved into, out of or shuffled within the reactor. A wide variety of edits may be performed, including perturbation and kinetic parameters calculations.CDC6600; FOR-

TRAN IV and COMPASS; SCOPE 3; 45,000 (decimal) core storage and 16 tape drives or distinct disk files plus I/O.

20525 (ANL/NESC—455) DAC1; SN perturbation code using DTF4 fluxes. Carmichael, B.M. (Lawrence Livermore National Lab., CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048455.

The FORTRAN IV programming techniques such as variable dimensioning used in DTF4 are retained in DAC1. Consequently, any combination of problem parameters may be used which will fit in the over-all available storage. Generally, the problems that fit for DTF4 can also be accommodated by DAC1.

DAC1 uses angular fluxes from the DTF4 SN code to calculate reactivity perturbations, effective delayed neutron fractions, and generation times in reactors. The reference reactor specifications are input to DAC1 by a direct reading of the DTF4 input deck. Consequently, the only additional input needed are the perturbation specifications.CDC6600; FORTRAN IV; SCOPE 3; 2 disk or tape files are required if angular fluxes are used.

20526 (ANL/NESC—456) DBUFIT1; least squares transmutation analysis. Matsen, R.P. (Pacific Northwest Lab., Richland, WA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048456.

The data from as many as 150 samples may be analyzed at one time.

DBUFIT1 is designed to extract integral cross section information from isotopic burnup data. This information is obtained by fitting burnup equations to the isotopic data using least-squares fitting techniques. Burnup equations for the following transmutation chains have been programmed - Pu239 to Pu242, U238 to Pu242, Pu242 to Cm244 and U235 to Pu238.UNIVAC1108; FORTRAN V; CSCX Operating System; Core memory requirements are 40,000 (octal) locations for instructions and almost 50,000 (octal) locations for data storage. A CalComp plotter is necessary if plotted results are desired.

20527 (ANL/NESC—457) GSSLRN1B; least squares photopeak spectra code. Seybold, G.D. (Pacific Northwest Lab., Richland, WA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048457.

Maxima of - 2048 channels from a multichannel analyzer per case 200 fitted peaks per case 250 channels per interval of fit 10 peaks per interval of fit 49 parameters per interval of fit These limits are based upon analysis of photopeaks described by symmetric Gaussian analytical form.

GSSLRN1B is utilized for evaluations and statistical determination of photopeaks in photon spectra. The code performs evaluations of photopeak spectra using as input the digitized, pulse-height distribution which is output from a large multichannel analyzer. Photopeaks are located, functions fit to each real peak, and the relative intensity of each fitted peak above the background continuum is calculated. The code is easily adaptable for analysis of any spectra which can be adequately defined by peaks represented in analytic form.UNIVAC1108; FORTRAN V with Assembler language used for two minor routines; CSCX Operating System; 65K core, 131,000 (octal) locations of scratch drum, two tapes, CalComp 763 plotter for plotting options.

20528 (ANL/NESC—463) 3DDT; 3-dimensional multigroup diffusion xyz or r-theta-z. Vigil, J.C. (Lawrence Livermore National Lab., CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048463.

3DDT is a three-dimensional (x-y-z or r-theta-z) multigroup, diffusion theory code for use in fast-reactor analysis. The code can be used to compute keff or to perform criticality searches on reactor composition, time absorption, and reactor dimensions by either the regular or the adjoint flux equations. Material burnup and fission-product buildup can be computed for specified time intervals, and criticality searches can be performed during burnup to compensate for fuel depletion and fission product growth.CDC6600; FORTRAN IV; SCOPE 3.2; CDC6600 computer with 65K words central memory, 500K ECS, 6,000K disk (four tape files are simulated on the disk), two magnetic tape units, and the usual input/output devices.

20529 (ANL/NESC—465) RESEND;ADLER; ENDF/B resonance cross section codes. Bhat, M.R.; Ozer, O. (Brookhaven National Lab., Upton, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048465.

RESEND generates infinitely-dilute, unbroadened, point cross sections in the ENDF format by combining ENDF File 3 background cross sections with points calculated from ENDF File 2 resonance parameter data. ADLER calculates total, capture, and fission cross sections from the corresponding Adler-Adler parameters in the ENDF/B File 2 Version II data and also Doppler-broadens cross sections.CDC6600;PDP10; FORTRAN IV; SCOPE 3.0; RESEND requires 24K (decimal) core with 2 scratch units, an input unit for the ENDF data, an output unit, a unit for reading in the run parameters (teletype or system input) and a unit for printing run-associated messages (teletype or system output). ADLER requires 37K (octal) memory.

20530 (ANL/NESC—466) APRFX1; 99-group DLC-2B library group-collapsing. Pickard, P.S. (Army Pulse Radiation Facility, Aberdeen Proving Ground, MD (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048466.

This version of the code uses the DLC-2B library in ANISN-DOT format. Upscattering is not included.

APRFX1 collapses and combines cross section sets for multigroup transport calculations. It performs group collapsing for as many isotopes, mixtures, and Legendre expansion sets as desired from the DLC-2B library. The DLC-2B library structure employs tenth lethargy unit intervals from 15 MeV to 111 keV and quarter lethargy intervals down to 0.414 eV. A 100th group 0.0 to 0.414 eV is used as a sink group. The code also determines the broad-group input source and generates averaged neutron velocities for use with transport calculations.CDC6600; FORTRAN IV.

20531 (ANL/NESC—467) HRG3; slowing-down spectrum, multigroup constants. Carter, J.L. (Pacific Northwest Lab., Richland, WA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048467.

The maximum number of broad groups is 33. Broad-group boundaries are adjusted internally to coincide with one of the 68 fine-group boundaries.

The code computes the slowing down spectrum over the energy range 10 MeV to 0.414 eV in either the B1 or P1 approximation, using 68 groups of neutrons with a constant group width of delta u = 0.25. The calculated flux and current spectra are used to reduce the original 68-group cross section data to average values over as many as 33 broad groups. Output is printed and may also be punched in formats for input to any of several spatial multigroup codes.UNIVAC1108;IBM360,370; FORTRAN IV; CSCX (UNIVAC1108), OS/360 (IBM360); 64K memory, normal input, output, program, and punch units, 1 unit for library, 1 to 4 scratch units or their equivalent on drum (UNIVAC1108); 200K memory, standard I/O units, 1 unit for library, and 1 scratch unit (IBM360).

20532 (ANL/NESC—471) GAPER2D; 2-dimensional perturbation calculation from 2DF output. Archibald, R.J.; Sargis, D.A. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048471.

Scattering anisotropy is limited to the P1 term.

GAPER2D is a two-dimensional transport perturbation theory program using the real and adjoint fluxes and currents from 2DF problem results to compute reactivity changes due to small perturbations in reflected multiregion systems.UNIVAC1108; FORTRAN V; EXEC2 or EXEC8; 65K fast memory, 2 tape units, 4 drum or disk files.

20533 (ANL/NESC—474) QX1; **quasistatic spatial reactor kinetics code.** Meneley, D.A. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048474.

Maximum of 30 energy groups 15 downscatter groups 6 delayed neutron families 20 spatial regions 16 material mixtures per region 150 mesh points.

QX1 solves the multigroup, one-dimensional, time-dependent diffusion equations. Problem geometry may be plane, cylindrical, or spherical. Steady-state initial conditions may be established either for a source-free system or for a system with an external neutron source. The reactor may be perturbed by changing material volume fractions and/or temperatures or by changing the neutron source level. A first-collision pulsed source distribution may be specified. Resonance absorption feedback is calculated by groupwise interpolation in a cross-section versus temperature table. A highly simplified fuel temperature model is included.IBM360/75; FORTRAN IV; OS/360; 450K byte memory, input, output, and punch datasets, a maximum of 2 cross section datasets, and a maximum of 6 scratch datasets.

20534 (ANL/NESC—477R) 3DXT;DEP3; **3-dimensional xenon transient and depletion.** Stacey, W.M.; Wade, D.C. (Knolls Atomic Power Lab., Schenectady, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048477.

3DXT maximum - 100 time-steps DEP3 maximum - 30 time-steps with 1 to 5 xenon-steps per depletion-step.

These two codes were developed for use with detailed reactor physics calculations to obtain 3-dimensional xenon transient (3DXT) and depletion (DEP3) calculations. They are well-suited for survey studies and because they incorporate three-dimensional effects with thermal feedback and rod search capabilities, are useful for assessing situations such as rod misalignments or fuel-loading and coolant-flow asymmetries which are time-consuming and often impossible to detect with detailed 1- or 2-dimensional codes.CDC6600; FORTRAN IV; 64K memory.

20535 (ANL/NESC—486) ANCON; **space-independent reactor kinetics code.** Vigil, J.C. (Lawrence Livermore National Lab., CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048486.

ANCON solves the point-reactor kinetic equations including thermal feedback. Lump-type heat balance equations are used to represent the thermodynamics, and the heat capacity of each lump can vary with temperature. Thermal feedback can be either a linear or a non-linear function of lump temperature, and the impressed reactivity can be either a polynomial or sinusoidal function.CDC6600;IBM360,303x; FORTRAN IV; SCOPE 3.2 (CDC6600) and OS/360 (IBM360); ANCON requires 32K words of central memory, one peripheral storage device (logical unit 1), card reader (logical unit 10), printer (logical unit 9), and card punch. Standard system-library functions and a CLOCK routine are used. The CLOCK routine is not essential. A dummy CLOCK routine is provided with the IBM360 version package.

20536 (ANL/NESC—488) NOISY1; **auto- and cross-spectral densities.** Sheff, J.R. (Sheff (James R.) Co., Richland, WA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048488.

Maximum of 50 terms per dimension in the six-dimensional series. The limit is thus 50**6 or about 16-billion terms. This is large enough so that the limit is really budgetary. Automatic convergence checking limits the maximum number of terms to approximately 300,000.

Auto- and cross-spectral density functions are calculated for neutron fluctuations in nuclear reactors. The calculations are pointwise, space-dependent in cubical reactors which are homogeneous and bare. Either neutron fluctuations or the fluctuations seen by a neutron detector can be specified. Fluctuations between either two points or between two finite regions can be considered. The finite regions or simulated detectors must either fully overlap or not overlap and are restricted in shape to rectangular parallelepipeds.UNIVAC1108; FORTRAN V; CSCX or EXEC2; 52K words memory.

20537 (ANL/NESC—490) JOSHUA OPERATING SYSTEM; **data storage, retrieval, and display.** Honeck, H.C. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048490.

JOSHUA is a scientific, modular data-based system for batch and terminal operation. Large volumes of data can be stored and retrieved for computation and display.IBM360,370,303x; FORTRAN IV (60%) and Assembler language (40%); OS/370, OS/3033; 200K bytes for batch operation, IBM3270 display station.

20538 (ANL/NESC—493) TROUT; **mug multigroup cross section library maintenance.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Kelley, M.D. (General Electric Co., San Jose, CA (USA). Nuclear Energy Div.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048493.

Up to four file tapes may be mounted and merged into a single file tape. A file tape may not have more than 30 files.

TROUT is a file maintenance program which allows the user to alter, merge, delete, overlay or create multigroup cross section files in MUG format.GE635;UNIVAC1108; FORTRAN IV; GECOS III (GE635) and EXEC2 (UNIVAC1108); 25K of fast memory, 6 tape drives, and 4000 words of peripheral storage (GE635).

20539 (ANL/NESC—494) ADEP; **1-dimensional and 2-dimensional few-group space-time kinetics.** Denning, R.S. (Battelle Columbus Labs., OH (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048494.

Variable dimensioning permits flexibility in the number of energy groups, number of delayed precursors, number of regions, and number of mesh points. Problems are initiated from equilibrium conditions. Zero flux boundary conditions apply at all surfaces.

The time-dependent few-group neutron diffusion equations are solved in one or two dimensions. Lumped parameter thermal-hydraulic equations are used to calculate feedback.CDC6400; FORTRAN IV; SCOPE 3.3; 40,000 (octal) memory needed to load the basic program.

20540 (ANL/NESC—502) EDITOR; **ENDF/B tape processing and editing.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Penny, S.K. (Oak Ridge National Lab., TN (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048502.

A maximum of 50 materials may be handled in one batch, where a batch is a group of associated input instructions. A maximum of 5 files per material and 15 sections per file may be requested in each batch. Files 1 to 5, 7, 12 to 15, and 23 will be processed by the program. Other files will be ignored.

EDITOR produces readable listings of the contents of ENDF/B nuclear data cross section tapes. It also allows copying, altering mode, merging and punching of the data on one or more ENDF/B tapes.IBM360;CDC6600; FORTRAN IV; OS/360 (IBM360), SCOPE (CDC6600); Approximately 300K bytes of core.

20541 (ANL/NESC—505) **TDOWN; spatial & composition-dependent cross sections.** Cowan, C.L. (General Electric Co., San Jose, CA (USA). Nuclear Energy Div.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048505.

Most of the restrictions on TDOWN are due to the limitations of the linked codes. Some of these limitations are - a generalized file has a maximum of 100 energy groups, and up to 120 material cross section sets may be generated.

TDOWN generates spatial and composition-dependent cross section sets from a Bondarenko type, generalized cross section file called GMUG. A TDOWN problem can be a simple description of material compositions with an input flux spectra or a problem can consist of a multi-region, two-dimensional reactor description with several zero- or one-dimensional flux solutions to provide the flux for spectral adjustments of the cross section sets.GE635; FORTRAN IV; GECOS III; The code requires 32K memory on a GE635, including a 10K overlap with the loading routines. In addition to the usual input/output units, 3 tape handlers and 6 files on a peripheral device (disk at the authors' installation) are used.

20542 (ANL/NESC—509) **ETOT2; thermal libraries from ENDF/B data.** Beard, C.L.; Dannels, R.A. (Westinghouse Electric Corp., Pittsburgh, PA (USA). Nuclear Energy Systems Div.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048509.

In addition to the restrictions on the ENDF/B data itself, ETOT2 has the following restrictions - Maximum number of groups or points = 309. Maximum number of resolved resonances = 500.

ETOT2 processes basic nuclear information given in the ENDF/B library tape Formats I and II and produces data decks for use in the generation of KATE, THERMOS (NESC Abstract 184), TEMPEST (NESC Abstract 50), and LASER (NESC Abstract 249) libraries.CDC7600; FORTRAN IV; CDC7600 SCOPE 1.7; The code requires 50K (decimal) memory on the CDC7600, uses 1 scratch tape, 1 library tape, and the standard input/output and punch units.

20543 (ANL/NESC—520) **PHROG; multi-group constant and fast spectra calculations.** Curtis, R.L.; Grimesey, R.A. (EG and G Idaho, Inc., Idaho Falls (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048520.

The code is restricted to a 68 group structure for input.

PHROG generates energy dependent fast neutron spectra and associated multigroup cross section data suitable for use in diffusion and transport theory reactor design analysis. The solution utilizes 68 equal lethargy groups of cross section, source, and leakage data over an energy range extending from 10 MeV to 0.414 eV. These data are then coalesced into broad group form using the fluxes and currents as weighting functions.IBM360; FORTRAN IV; OS/360; 200K bytes memory and six I/O devices including card reader, printer, card punch, tape unit for cross section library, and 2 scratch units.

20544 (ANL/NESC—522) **ARC-SYSTEM; system subprograms and modules.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Walker, P.M. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048522.

BCD input data restrictions are set at 100 ARC System data blocks and 2000 EBCDIC data cards. An ARC System data block is a named set of data containing named subblocks of data which are processed into data sets by a call to the system routine BCDDS.

ARC-SYSTEM is the collection of systems subprograms and modules which provide the software environment necessary to execute the modular computational capabilities of the Argonne Reactor Computation (ARC) System on IBM360 systems.IBM360/50 and larger models; FORTRAN IV, Assembler language, and macro definitions; OS/360 Release 19; The resident portion of the system itself requires about 15K bytes. To test the system requires about 220K bytes plus one peripheral I/O device.

20545 (ANL/NESC—523) **ESP; Monte Carlo reactor analysis calculation.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Lucius, J.L. (Oak Ridge National Lab., TN (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048523.

ESP is a general-purpose Monte Carlo reactor analysis code. It covers the complete energy range of interest in reactor calculations and is designed for both eigenvalue and fixed source reactor and reactor cell calculations. Basic data are accepted only in the Version I, II, and III ENDF/B format. In addition to smooth data, the cross section preparation includes a detailed treatment of resolved and unresolved resonances and the free gas and s(alpha,beta) thermal models. The collision and source routines utilize the ENDF/B nonelastic secondary distributions, the anisotropic scattering data, and the fission spectra. The energy range may be divided into as many as 25,000 intervals, and over each interval the appropriately averaged cross sections are used as constant point-energy values. A general three-dimensional geometry description is available, as well as several specialized geometries. Use of fixed-source options allows calculations on non-multiplying systems. A steady-state analysis of neutron histories is performed in computer core for such quantities as neutron fluxes, reaction rates, and cross sections, averaged over arbitrary energy and spatial regions.IBM360/75,91; FORTRAN IV and BAL; At least 350K bytes of computer core.

20546 (ANL/NESC—526) **CLUP77; square cell collision probability calculations.** Tsuchihashi, K. (Japan Atomic Energy Research Inst., Tokai, Ibaraki. Tokai Research Establishment). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048526.

A maximum of 120 assemblies are allowed and all assemblies must be symmetric both bilaterally and diagonally.

CLUP77 computes the collision probabilities in a multiregion square assembly of clustered fuel rods. The assembly can be made up of rods of infinite height and divided into rectangular pillars containing a nest of concentric annuli of different materials. The outer boundary of the assembly may be treated as reflective or a vacuum.FACOM230-60;IBM360; FORTRAN IV; FACOM Operating System (FACOM 230-60) and OS/360 (IBM360); 57K (octal) words on the FACOM, 250K bytes on the IBM360.

20547 (ANL/NESC—531R) **CLEM; angular distribution Legendre fitting.** Slavik, C.J. (Knolls Atomic Power Lab., Schenectady, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048531.

CLEM generates constrained Legendre moments for neutron scattering angular distributions. The constraint is that the angular distribution itself should be non-negative.CDC6600; FORTRAN IV; SCOPE 3.2; 300K, usual I/O, and one tape unit.

20548 (ANL/NESC—532) LASL group-averaged cross-sections; SN 18- 24- and 25-group sets. Mills, C.B. (Lawrence Livermore National Lab., CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048532.

Group constants and computed neutron cross sections are tabulated for a variety of materials including - Al, B, Be, C, Cd, Cl, D, Ga, F194, Fe, H, K, Li6, Mo, Na, Ni, O, Pu239, Pu240, Pu249, Th, U233, U235, U238, and Zr. These are presented as 18-, 24-, and 25-group calculations for reactors with neutron energies ranging from fast to thermal.CDC6600; FORTRAN IV; SCOPE.

20549 (ANL/NESC—533) ARC-NUI002 BCD Input Processor; BCD input data processing module. Kovalsky, E.A. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048533.

The module ARC(NUI002) processes general neutronics input data sets for subsequent use by the neutronics-computational modules of the Argonne Reactor Computation (ARC) System.IBM360/50 and larger models; FORTRAN IV; OS/360 MVT; About 255K bytes are required with a 10,000 double-word container (default). One peripheral I/O device is required.

20550 (ANL/NESC—535R) MULTI; multi-level resonance theory cross section calculations. Slavik, C.J. (Knolls Atomic Power Lab., Schenectady, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048535.

Only s-wave incident neutrons are allowed.

MULTI computes scattering cross sections.CDC6600; FORTRAN IV; SCOPE; Input, output, and two tape units.

20551 (ANL/NESC—536) RAHAB Lattice Physics Modules; JOSHUA system lattice physics modules. Honeck, H.C. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048536.

The code is restricted to 150 mesh points, 100 energy groups and 50 different isotopes.

RAHAB is a two-dimensional, multigroup, neutron integral transport code. Its capability includes full or subdivided annular, square and hexagon regions, clusters and multicell (mixed lattices). The multigroup structure can include thermal, epithermal, and fast energy regions. The number of energy groups is variable from 1 to 100. Buckling and time eigenvalue searches are allowed options.IBM360; FORTRAN IV; OS/360 and HASP; 260K bytes.

20552 (ANL/NESC—538) ETOG3; ENDF/B to MUFT, GAM, ANISN cross-section format. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Kellman, S. (Westinghouse Electric Corp., Pittsburgh, PA (USA). Nuclear Energy Systems Div.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048538.

In addition to the restrictions on the ENDF/B data itself, ETOG3 has the following maxima - 99 multigroups 500 resolved resonances.

ETOG3 processes basic nuclear information given in ENDF/B Version III format producing data decks for use in generation of MUFT4, MUFT5, GAM1, GAM2, and ANISN libraries.CDC7600; FORTRAN IV; SCOPE 2.0; 42,000 decimal locations and 4 scratch and punch units, 17,000 decimal locations of extended core memory.

20553 (ANL/NESC—877) K-FIX;3D; three-dimensional extension two-phase flow dynamics. Rivard, W.C.; Torrey, M.D. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048877.

This package consists of two programs K-FIX(3D) and K-FIX(3D,FLX) which extend the transient, two-dimensional, two-fluid program K-FIX (NESC Abstract 727) to perform three-dimensional calculations. The transient dynamics of three-dimensional, two-phase flow with interfacial exchange are calculated at all flow speeds. Each phase is described in terms of its own density, velocity, and temperature. The application is to flow in the annulus between two cylinders where the inner cylinder moves periodically perpendicular to its axis. K-FIX(3D) is easily adaptable to a variety of two phase flow problems while K-FIX(3D,FLX) combines KFIX(3D), the three-dimensional version of the KFIX code, with the three-dimensional, elastic shell code FLX for application to a very specific class of problems. KFIX(3D,FLX) was developed specifically to calculate the coupled fluid-structure dynamics of a light water reactor core support barrel under accident conditions. Motion may be induced by blowdown, prescribed displacement, or seismic action.CDC7600; FORTRAN IV; SCOPE; The K-FIX(3D) sample problem, excluding plotting and timing routines, took about 50,000 (octal) words of small core memory (SCM) and 65,000 (octal) words of large core memory (LCM) storage. The K-FIX(3D,FLX) sample problem, excluding plotting and timing routines, took about 71,300 (octal) words of SCM and 570,000 (octal) words of LCM storage.

20554 (NUREG/CP—0034-Vol.1) Proceedings of the topical meeting on advances in reactor physics and core thermal hydraulics. (Nuclear Regulatory Commission, Washington, DC (USA)). Aug 1982. 549p. (CONF-820925—Vol.1). NTIS, PC A23/MF A01 - GPO $12.00. Order Number DE82906283.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

Technical papers presented at the ANS Topical Meeting on Advances in Reactor Physics and Core Thermal Hydraulics, September 22-24, 1982, at Kiamesha Lake, N.Y. are included in these Proceedings. Reactor physics, core thermal hydraulics, and the interactions between core physics and thermal hydraulics are covered both for thermal reactors and for fast breeders. There are sessions on current challenges in these areas, on measurement and analysis of fast reactor physics parameters, on coupled core physics and thermal-hydraulics analysis, on in-core fuel management, on nodal and homogenization methods in reactor physics, and on core thermal hydraulic and nuclear instrumentation.

20555 (NUREG/CP—0034-Vol.1, pp 364-376) Extensions of the nodal expansion method based on the application of finite element techniques. Robinson, M.A.; Rydin, R.A. (Univ. of Virginia, Charlottesville). Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

In the present study, the inclusion of trial functions in the Nodal Expansion Method (NEM), by means of techniques associated with the Finite Element Method (FEM), is explored. The results of several methods based on these techniques are examined, in terms of the capability to reproduce detailed flux shapes within a mesh box.

20556 (NUREG/CP—0034-Vol.1, pp 377-383) Response matrix nodal methods for thermal and fast reactor applications. Becker, M. (Rensselaer Polytechnic Inst., Troy, NY). Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

Response matrix nodal methods have been applied to both thermal and fast reactor problems. Several common nodal procedures are included as special cases. The general framework has been adaptable to modifying existing options and introducing new ones. For thermal reactors, several options give comparable, acceptable results. Current attention is being devoted to numerical efficiency. For fast reactors, results are sensitive to option used. A reflection-based coarse mesh method has been introduced for fast reactors which has been more successful than other options.

20557 (NUREG/CP—0034-Vol.1, pp 384-390) **Nodal method for direct intra-node ditribution calculation.** Chao, Y.A.; Penkrot, J.A. (Carnegie-Mellon Univ., Pittsburgh, PA). Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

A nodal method is developed which calculates intra-node flux distribution directly but solves only nodal equations of conventional structure and simplicity. For a given homogeneous node, the intra-node flux is rigorously and analytically expressed as a sole surface intergral of the complete multi-group and multi-dimensional Green's function and the surface fluxes. Assuming parabolic surface flux profiles, nodal equations involving surface fluxes as the only unknowns are derived. Each surface profile is expressed in terms of the flux values at the corners of a surface and the averaged flux value on that surface. For a 2-D (or 3-D) node, there are all together three (or four) unknowns; they are one corner flux and two (or three) surface averaged fluxes. Once these corner and surface averaged fluxes are solved from the nodal equations, the parabolic surface profile is known and the intra-node flux is immediately obtained.

20558 **(PB—82-228933) Nuclear data guide for reactor neutron metrology. part I: activation reactions (1979 edition). Part II: fission reactions (1979 edition).** Zijp, W.L.; Baard, J.H. (Commission of the European Communities, Luxembourg). [nd]. 246p. NTIS, PC AE09/MF E09.

This guide is a collection of data for activation and fission reactions, expressed throughout in SI units. The activation data are shown in the form of a cross-section as a function of energy, and two figures showing the energy dependence of the response function. These response plots are given for a light water reactor based on the Petten high flux reactor, and for a CTR Tokamak neutron spectrum. Similar data are presented for the fission reactions. In all cases the decay schemes are illustrated.

20559 **Calculating fission product decay energies and spectra using adjusted data.** George, D.C.; England, T.R.; LaBauve, R.J. (Los Alamos National Laboratory, P.O. Box 1663, Los Alamos, NM 87545). *Transactions of the American Nuclear Society;* **41**: 496-497(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

20560 **Feasibility of LWR subcritical reactivity monitoring using the /sub 252/ CF-driven neutron noise method.** Mihalczo, J.T.; King, W.T.; Renier, J.A. (Oak Ridge National Laboratory, Oak Ridge, TN 37830). *Transactions of the American Nuclear Society;* **41**: 619-620(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

20561 **Definition of experimental procedures to assure quality in a program of mixed-oxide critical experiments.** Malenfant, R.E.; Evans, A.E. Jr.; Forehand, H.M. Jr. (Los Alamos National Laboratory, P.O. Box 1663, Los Alamos, NM 87545). *Transactions of the American Nuclear Society;* **41**: 352(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

2202 Components And Accessories

REFER ALSO TO CITATION(S) 22497

20562 **(ANL/NESC—278) WHAM6; liquid-filled piping system analysis.** Berta, V.T. (EG and G Idaho, Inc., Idaho Falls (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048278.

Maxima of100 legs 50 nodes per leg 2 different valves or breaks (additional ones have the properties of the second one) 4 pumps 1 pressurizer 1 case per execution The limits of 100 legs and 50 nodes per leg are imposed by DIMENSION and DATA statements, and can be changed to accommodate other models whenever memory space is available. Applications using 244 legs, 26 nodes per leg, for the hydraulic model have been completed at EG and G. Turbine operation range is not considered because it is assumed that each pump is provided with a check valve.

WHAM6 is used to calculate pressure and velocity transients in liquid-filled piping networks. It can be applied to multiloop complex piping networks consisting of dead ends, elbows, orifices, multiple-branch tees, changes of flow passage cross section, check valves, pumps, pressurizers or tanks, and exit valves or breaks. Hydraulic losses are considered. Transients can be initiated either by closure or opening of one or more exit valves (equivalent to system ruptures) or by a prescribed gas pressure history in a pressurizer tank.IBM360,370;CDC6600,7600; FORTRAN IV and BAL (IBM360), FORTRAN IV (CDC7600); OS/360,370 (IBM360,370), SCOPE 2.1.3 (CDC7600); 480K bytes of memory (IBM370/195), 101,000 (octal) words (CDC7600).

20563 **(ANL/NESC—284R) M0555;ACT1; loss-of-coolant accident analysis.** Fuls, G.M. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048284.

There are three regular inflow tables, one table for spray flow, 20 heat sinks, two linear and one log-log heat input tables, and two special inflow tables for FLASH output.

This program will predict the pressure transient in the containment vessel as a function of time as a result of a major rupture in the primary system of a pressurized water reactor. Means are available for introducing water and heat into the containment vessel. There are also provisions for specifying various types of heat sinks for energy absorption. The temperature distribution in these heat sinks is calculated as a function of time. Discharge rates of the containment may also be determined as a function of both time and the internal pressure.CDC6600; FORTRAN IV; SCOPE 2.0.

20564 **(ANL/NESC—295R) FLASH3; loss-of-coolant accident analysis.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Davis, V.C. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048295.

The reactor plant must be represented by 20 or less pressure-determining nodes and 40 or less flow paths. The plant and core geometry are assumed fixed in time. Hence, the solution is not applicable after significant core melting.

FLASH3 determines the transient response of a water-cooled reactor to a loss-of-coolant accident or severe variable pressure operation.CDC6600; FORTRAN IV; SCOPE 3.1; 64K memory.

20565 **(ANL/NESC—299R) LION4;LION; three-dimensional temperature distribution program.** Binney, E.J. (Knolls Atomic Power Lab., Schenectady, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048299.

LION4 is a computer program for calculating one-, two-, or three-dimensional transient and steady-state temperature distributions in reactor and reactor plant components. It is used primarily for thermal-structural analyses. It utilizes finite difference techniques with first-order forward difference integration and is capable of handling a wide variety of bounding conditions. Heat transfer situations accommodated include forced and free convection in both reduced and fully-automated temperature dependent forms, coolant flow effects, a limited thermal radiation capability, a stationary or stagnant fluid gap, a dual dependency (temperature difference and temperature level) heat transfer, an alternative heat transfer mode comparison and selection facility combined with heat flux direction sensor, and any form of time-dependent boundary temperatures. The program, which handles time and space dependent internal heat generation, can also provide temperature dependent material properties with limited non-isotropic properties. User-oriented capabilities available include temperature means with various weightings and a complete heat flow rate surveillance system.CDC6600,7600;UNIVAC1108;IBM360,370; FORTRAN IV and ASCENT (CDC6600,7600), FORTRAN IV (UNIVAC1108A,B and IBM360,370); SCOPE (CDC6600,7600), EXEC8 (UNIVAC1108A,B), OS/360,370 (IBM360,370); The CDC6600 version plotter routine LAPL4 is used to produce the input required by the associated CalComp plotter for graphical output. The IBM360 version requires 350K for execution and one additional input/output unit besides the standard units.

20566 (ANL/NESC—330) ECCSA4; **loss-of-coolant & emergency cooling.** Cudnik, R.A. (Battelle Columbus Labs., OH (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048330.

The fuel rod can be represented by up to 11 radial nodes and 24 axial segments. Each axial segment has associated with it an equivalent axial segment of the fluid channel surrounding the fuel rod. Thus a maximum of 24 axial segments in the flow channel is allowed.

ECCSA4 predicts the thermal and hydraulic behavior of a single fuel rod and its associated core flow channel during a loss-of-coolant accident and subsequent emergency core cooling injection.CDC6400; FORTRAN IV; SCOPE 3.3; 110K octal memory, one tape for restart capability, one tape for plotting data if desired..

20567 (ANL/NESC—391R) SORSDB; **pressure vessel stress and fatigue.** Carlson, F.C.; Dobson, R.E. (Knolls Atomic Power Lab., Schenectady, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048391.

As many as 100 points on the vessel may be evaluated for a maximum of 15 operating conditions and 50 fatigue cycles.

SORSDB was written to calculate the stress intensities and fatigue usage factors for pressure vessels (structural members) in accordance with the ASME Code, Nuclear Vessels, Section 3. The input requires the basic membrane and bending stresses generated by the SOR2 code (NESC Abstract 80) or any adaptable shell program. The output includes stress differences, stress intensities, and fatigue usage factors.CDC6600; FORTRAN IV.

20568 (ANL/NESC—395) FLAC; **steady-state flow, pressure distribution.** Malek, G.J. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048395.

The FLAC program does not consider two-phase flow or open-channel flow, as in hydraulics.

The flow analysis code FLAC calculates the steady-state flow and pressure distribution in an arbitrary network. The program includes the possibility of heat addition and mass addition in any portion of the network.UNIVAC1108;IBM370;CDC6600; FORTRAN V (UNIVAC1108) and FORTRAN IV (IBM370 and CDC6600); EXEC2 (UNIVAC1108), OS/370 (IBM370), SCOPE (CDC6600); The computer storage requirements for FLAC are flexible, and the size of the various arrays can be adjusted to suit any problem. With all arrays set to their maximum, a problem consisting of 1500 branches and 700 nodes requires approximately 50,000 storage locations on the UNIVAC1108. 180K bytes of memory are needed for the IBM370 version and 72,000 (octal) words of memory are required for the CDC6600 version..

20569 (ANL/NESC—433) CONTEMPT-LT/028;CONTEMPT-LT/026; **pressure-temperature response.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Cheng, T. [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048433.

Maxima of - 20 heat conducting structures 101 mesh points for each structure 20 regions for each structure 50 flow elements in one segment of the horizontal vent pressure suppression system 10 horizontal vents (or branches) in a segment 50 reductions within an input time-step CONTEMPT-LT can be used for analyzing the transient containment behavior of boiling-water reactors (BWRs) including Mark I, Mark II, and Mark III systems; pressurized-water reactors (PWRs), and experimental water reactor simulators or related experiments.

CONTEMPT-LT was developed to predict the long-term behavior of water-cooled nuclear reactor containment systems subjected to postulated loss-of-coolant accident (LOCA) conditions. CONTEMPT-LT calculates the time variation of compartment pressures, temperatures, mass and energy inventories, heat structure temperature distributions, and energy exchange with adjacent compartments. The program is capable of describing the effects of leakage on containment response. Models are provided for fan cooler and cooling spray engineered safety systems. One to four compartments can be modeled, and any compartment except the reactor system may have both a liquid pool region and an air-vapor atmosphere region above the pool. Each region is assumed to have a uniform temperature, but the temperatures of the two regions may be different. The user determines the compartments to be used, specifies input mass and energy additions, defines heat structure and leakage systems, and prescribes the time advancement and output control.CDC7600,CYBER176;IBM360; FORTRAN IV and COMPASS (CDC7600), FORTRAN IV and BAL (IBM360); SCOPE 2.1 (CDC7600), OS/MVT (IBM360); 58K (octal) bytes and a CalComp or microfilm plotter (CONTEMPT-LT/028); 430K bytes and a CalComp or SC4060 plotter for graphical output (CONTEMPT-LT/026).

20570 (ANL/NESC—503R) DUZ2; **2-dimensional axisymmetric and plane elastic-plastic.** Peterson, W.D.; Jeffrey, C. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048503.

The program provides for up to 99 regions, to describe material properties and boundary conditions. There may be up to 5000 points in a rectangular array, with at most 250 mesh rows or columns. Because of the initial strain method, plastic strains should not be significantly larger than elastic strains.

DUZ2 performs two-dimensional elastic-plastic stress calculations. The program treats axially symmetric bodies or plane regions (plane stress or plane strain) assuming deformation theory. Loading conditions may be a non-uniform temperature distribution, body forces, and boundary displacements or stresses.CDC6600; Although the program is written primarily in FORTRAN IV, certain inner loop routines were optimized using COMPASS. Also, the program calls on COMPASS routines which are a part of the Bettis computing environment.; SCOPE 3.1; The program was written for a CDC6600 with a central memory size of at least 64K, reader, printer, a system disk and 4 non-system disks each on its own channel. The program makes optional use of extended core storage and CDC-280 microfilm output.

20571 (ANL/NESC—542) PSA2; **stress analysis multianchor pipe system.** Nickols, A.N. (Atomics International Div., Canoga Park, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048542.

Maximum of - 36 sections.

PSA2 computes the reactions and stresses caused by thermal expansion and loads in a multi-anchor piping system which may contain loops and may be partially restrained at any point in any direction.IBM360,370; FORTRAN IV (H); OS/360; 64K memory.

20572 (ANL/NESC—853) **SURGTANK; reactor steam surge tank dynamics.** Gorman, D.J.; Gupta, R.K. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048853.

The program was developed for predicting pressure behavior in vertical axis cylindrical tanks with spherical dome caps. It could be readily adapted to other geometries, such as spherical tanks (reference 2). Back-to-back insurges and outsurges cannot be treated since each must start from equilibrium conditions. The analysis does not include the effects of heaters, sprays, and safety valves. Possible modifications to include effects of sprays are discussed in reference 5.

SURGTANK generates the steam pressure, saturation temperature, and ambient temperature history for a nuclear reactor steam surge tank (pressurizer) in a state of thermodynamic equilibrium subjected to a liquid insurge described by a specified time history of liquid levels. It is capable also of providing the pressure and saturation temperature history, starting from thermodynamic equilibrium conditions, for the same tank subjected to an outsurge described by a time history of liquid levels. Both operations are available for light- or heavy-water nuclear reactor systems. The tank is assumed to have perfect thermal insulation on its outer wall surfaces.IBM360,370; FORTRAN IV; OS/360 (IBM360), OS/370 (IBM370); 110K bytes of storage for the insurge problem and 92K bytes of storage for the outsurge problem.

20573 (ANL/NESC—898) **OCTAVIA; pressure vessel failure probabilities.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Goldberg, F.F. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048898.

Maxima of - 100 temperatures 12 fluences 8 flaw sizes with the program's current dimensioning. Only axially oriented flaws in the vessel beltline are considered.

OCTAVIA (Operationally Caused Transients And Vessel Integrity Analysis) calculates the probability of pressure vessel failure from operationally-caused pressure transients which can occur in a pressurized water reactor (PWR). For specified vessel and operating environment characteristics the program computes the failure pressure at which the vessel will fail for different-sized flaws existing in the beltline and the probability of vessel failure per reactor year due to the flaw. The probabilities are summed over the various flaw sizes to obtain the total vessel failure probability. Sensitivity studies can be performed to investigate different vessel or operating characteristics in the same computer run.IBM370,303x; FORTRAN IV; OS/370; OCTAVIA requires approximately 170K bytes of storage for execution of the sample problem on an IBM370/195 or 3033.

20574 (NUREG/CP—0036) **Proceedings of the workshop on nuclear-power-plant aging.** Bader, B.E.; Hanchey, L.A. (comps.). (Sandia National Labs., Albuquerque, NM (USA)). Nov 1982. Contract AC04-76DP00789. 288p. (SAND—82-2264C; CONF-820876—). NTIS, PC A13/MF A01 - GPO. Order Number DE83003875.

From Workshop on nuclear power plant aging; Bethesda, MD, USA (4 Aug 1982).

The Nuclear Regulatory Commission (NRC) organized the workshop on Nuclear Power Plant Aging held August 4-5, 1982 in Bethesda, Maryland, to facilitate an exchange of thoughts between the NRC and industry on the subject of time-related degradation and its influence on reactor safety. The workshop objectives were to define the problem, to discuss the state of knowledge on aging phenomena, and to identify future activities necessary to understand the problem. The theme of the workshop was Where We Are Today and What Should We Be Doing.

20575 (NUREG/CP—0036, pp 19-22) **Effect of aging on the performance of safety-related equipment.** Gleason, J.F. (Wyle Labs., Huntsville, AL). Nov 1982. NTIS, PC A13/MF A01 - GPO.

From Workshop on nuclear power plant aging; Bethesda, MD, USA (4 Aug 1982).

The nuclear power industry has made a concentrated effort to include in the qualification of safety-related equipment the concept of aging. This paper discusses the general philosophy of the inclusion of aging concepts, the application of those concepts into equipment qualification test efforts, and the results of aging on the operability of this equipment.

20576 (NUREG/CP—0036, pp 23-28) **Accelerated aging methods of electrical equipment at Electricite de France.** Roubault, J. (Electricite de France, Cedex). Nov 1982. NTIS, PC A13/MF A01 - GPO.

From Workshop on nuclear power plant aging; Bethesda, MD, USA (4 Aug 1982).

The nuclear safety requirements for class IE electrical equipment imply the simulation of natural aging in qualification test programs. Such requirements quite agree with E.D.F. practice of qualification tests in order to show aptitude to long-life service of conventional equipment for electrical generation and supply. Such procedures, whose elaboration needs sometimes up to five years, have now the benefit of enough experience to appreciate their effectiveness. From another standpoint, class IE equipment is often identical or similar to conventional equipment. For these reasons, E.D.F. tended towards the use of its conventional aging procedures or of similar ones. Such procedures are actually used for equipment that does not have to function during a loss-of-coolant accident (LOCA) or main steam link break (MSLB).

20577 (NUREG/CP—0036, pp 29-41) **Equipment aging: an overview of status and research needs.** Carfagno, S.P. (Franklin Research Center, Philadelphia, PA). Nov 1982. NTIS, PC A13/MF A01 - GPO.

From Workshop on nuclear power plant aging; Bethesda, MD, USA (4 Aug 1982).

The problem of equipment aging in nuclear power generating stations is viewed from the standpoint of the qualification of safety-related equipment. A brief summary of developments related to equipment aging and qualification (in industry, the regulatory arena, and in the research area) is presented to focus on the current status of the problem. Several research topics are suggested for consideration as components of any general plan of research on plant aging. Among these is a topic concerned with an effort to establish the relative merit of different approaches to account for the functional degradation of equipment in terms of their cost and their contribution to assurance of public safety and a topic to investigate ways to improve the monitoring of functional degradation of equipment in service. Some factors to be considered in choosing among research topics and in establishing funding levels are mentioned.

20578 (NUREG/CP—0036, pp 42-50) **Methodology for estimating remaining life of components using multifactor accelerated life tests.** Thomas, R.E.; Gaines, G.B.; Epstein, M.M. (Battelle Columbus Labs., OH). Nov 1982. NTIS, PC A13/MF A01 - GPO.

From Workshop on nuclear power plant aging; Bethesda, MD, USA (4 Aug 1982).

Accelerated life tests are recommended for estimating the remaining service life of complex, service-aged components. The multifactor life tests are developed by a select team of scientists with 4 to 6 man-months of effort in accord with a set of agendas described in the paper. Factorial tables, hierarchical trees, and associated mathematical models are used to guide the efforts of the design team in obtaining an experimental design that is scientifically and statistically defensible.

20579 (NUREG/CP—0036, pp 59-78) **Condition monitoring.** Wanless, J.W. (NUS Corp., Menlo Park, CA). Nov 1982. NTIS, PC A13/MF A01 - GPO.

From Workshop on nuclear power plant aging; Bethesda, MD, USA (4 Aug 1982).

This paper presents an alternative method for addressing aging of equipment in nuclear power plants. Condition monitoring is the term used for an empirical surveillance technique by which the damage caused by environmental stress imposed on equipment is periodically assessed. The assessment of existing damage versus the undamaged and failed conditions allows for extrapolation of remaining life. A discussion of currently used Arrhenius and statistical techniques used to calculate useful life and their relationship to condition monitoring is given in the paper. A simple example of the condition monitoring method and the advantages of the method are discussed.

20580 (NUREG/CP—0036, pp 81-89) **Functional qualification of mechanical components and considerations for aging problems.** Brown, E.J. (Nuclear Regulatory Commission, Washington, DC). Nov 1982. NTIS, PC A13/MF A01 - GPO.

From Workshop on nuclear power plant aging; Bethesda, MD, USA (4 Aug 1982).

This paper provides a review of functional qualification and considerations for aging for pumps and valves used in commercial nuclear power plants. This multipurpose paper provides an overview of the status of qualification standards for pumps and valves and how aging is being considered; provides a discussion of qualification approaches; gives examples of aging of valves; and offers some suggestions for progress in the future.

20581 (NUREG/CP—0036, pp 90-106) **Operation testing and maintenance approach to aging problems in mechanical components.** Beatty, D. (Burns & Roe, Inc., Orabell, NJ). Nov 1982. NTIS, PC A13/MF A01 - GPO.

From Workshop on nuclear power plant aging; Bethesda, MD, USA (4 Aug 1982).

The ASME Committee on Operation and Maintenance of Nuclear Power Plant Components recognizes the importance of aging and degradation to mechanical equipment which must operate to perform a safety function to nuclear power plants. The approach taken by the Committee in developing standards is primarily one of inservice testing and preventative maintenance coupled with qualification and production testing of components. This paper describes the approach taken by the ASME Committee on Operation and Maintenance of Nuclear Power Plant Components in developing requirements to detect, evaluate and control aging problems in mechanical components.

20582 (NUREG/CP—0036, pp 121-130) **Overview of synergistic aging effects.** Steigelmann, W.; Farber, M. (Synergic Resources Corp., Bala Cynwyd, PA). Nov 1982. NTIS, PC A13/MF A01 - GPO.

From Workshop on nuclear power plant aging; Bethesda, MD, USA (4 Aug 1982).

Proper, technically defensible qualification of materials and equipment for nuclear power facilities requires that the effects of combined environment exposures be addressed. The full significance of synergistic effects resulting from combined stresses still remains largely an unknown to be provided for by use of conservatisms, allowing a sizeable margin in test programs and analyses to account for possible combined effects. However, these margins, when applied to sequential aging tests, may under- or over-estimate the qualified life of the material or equipment. Experimentation with radiation dose-rate effects, simultaneous vs. sequential ordered exposures, and other combined environment testing are highlighted in this paper to provide an overview of the current state-of-knowledge concerning synergistic effects and their significance to qualification programs.

20583 (NUREG/CP—0036, pp 131-136) **State regulator views the aging of nuclear power plants.** Keating, J.B. (New York State P.S.C., Albany). Nov 1982. NTIS, PC A13/MF A01 - GPO.

From Workshop on nuclear power plant aging; Bethesda, MD, USA (4 Aug 1982).

This report provides the author's views of the current status of operating nuclear power plants as they are affected by replacement or major repairs of large components. Opinions expressed in this report are subjective, based on the author's experience with regulation of utility companies in New York State. Costs associated with long outages required for replacement of major components are mentioned, as well as areas where attention should be given to help achieve forty years of design life for nuclear plants.

20584 (NUREG/CP—0036, pp 142-146) **Maintaining qualified life of equipment and parts in nuclear power plants.** Agnihotri, N.K. (Equipment Qualification Engineering Services, Inc., Lombard, IL). Nov 1982. NTIS, PC A13/MF A01 - GPO.

From Workshop on nuclear power plant aging; Bethesda, MD, USA (4 Aug 1982).

This paper describes certain approaches which may extend the available qualified life of an item (the term item is used to designate an item of equipment or a part of an equipment item) during storage or during in plant service. These approaches include: reduction of the time period between manufacturing an item and supplying it to the plant, and reforming of items in storage. The use of existing information available in the industry standards and sharing of results of qualification test efforts among various users are emphasized. The purpose of this paper is to invite industry's attention to the need for coordination in the existing qualification test and analysis efforts. The paper aims at initiating additional research efforts needed to provide directions to ensure maintenance of qualified life.

20585 (NUREG/CP—0036, pp 147-164) **Impact of preconditioning on the qualification of safety-related equipment.** Isgro, J.R. (Gibbs & Hill, Inc., New York, NY). Nov 1982. NTIS, PC A13/MF A01 - GPO.

From Workshop on nuclear power plant aging; Bethesda, MD, USA (4 Aug 1982).

This paper shares some recent experiences on the effects of preconditioning on the qualification of safety-related equipment not located in a harsh environment. Environmental and seismic qualification testing programs were conducted following the guidelines of IEEE 323-1974, IEEE 344-1975 and appropriate IEEE daughter standards, where available. The examples that follow will illustrate the degree of pre-conditioning of safety-related equipment qualified to the requirements of IEEE-323-1974, and its effect on the outcome of the qualification program.

20586 (NUREG/CP—0036, pp 165-175) **Equipment qualification maintenance.** Scates, R.M. (Wyle Labs., Huntsville, AL). Nov 1982. NTIS, PC A13/MF A01 - GPO.

From Workshop on nuclear power plant aging; Bethesda, MD, USA (4 Aug 1982).

Over the past few years, the nuclear power industry has devoted a great deal of attention to achieving equipment qualification. As this goal approaches, the attention of prudent utilities is now being directed toward maintaining that qualification throughout the useful life of the equipment. This paper presents a Qualification Maintenance Program (QMP) which is designed to meet the Nuclear Regulatory Commission requirements for ongoing qualification maintenance of safety-related equipment.

20587 (NUREG/CP—0036, pp 190-202) **Comments on the prediction of service lives of polymeric materials by the Arrhenius methods.** Brown, M. (E.I. Du Pont de Nemours Co., Wilmington, DE). Nov 1982. NTIS, PC A13/MF A01 - GPO.

From Workshop on nuclear power plant aging; Bethesda, MD, USA (4 Aug 1982).

In recent years the Arrhenius equation has been incorporated into certain important performance specifications in order to predict the long-term performance characteristics of polymeric materials. Furthermore, Underwriters' Laboratory has used the technique for many years to determine a so-called temperature rating for polymerics. This discussion is intended to clarify the theoretical and experimental bases for the Arrhenius equation and to discuss its applicability to the question of polymer aging.

20588 (NUREG/CP—0036, pp 203-214) **Brief overview and comparison of thermal aging models used for power plant equipment qualification.** Chamow, M.F. (Gilbert Associates, Inc., Reading, PA). Nov 1982. NTIS, PC A13/MF A01 - GPO.

From Workshop on nuclear power plant aging; Bethesda, MD, USA (4 Aug 1982).

Some of the confusion that often accompanies conversions or comparisons among the various thermal aging models used for power plant equipment qualification evaluations is alleviated by the methods described in this paper. Specifically, an Arrhenius-based model is examined and compared with relatively more approximate models, such as the so-called ten-degree rule and other representations of aging acceleration found in test reports and technical literature. Based on the comparisons performed, useful conversions are developed, and are presented as formulas, tables, and graphs.

20589 (NUREG/CP—0036, pp 215-216) **EPRI-sponsored correlation of age-sensitivity and seismic qualification.** Gleason, J.F. (Wyle Labs., Huntsville, AL). Nov 1982. NTIS, PC A13/MF A01 - GPO.

From Workshop on nuclear power plant aging; Bethesda, MD, USA (4 Aug 1982).

The Electric Power Research Institute (EPRI) has sponsored research by Wyle Laboratories into the correlation between age-sensitivity and the seismic performance of safety-related equipment. The purpose of the research is to analytically and experimentally evaluate the correlation between the effects of thermal aging and operational cycling on the ability of selected electronic and electrical components to perform in a seismic environment. The results of this research provide the technical justification for exempting from aging, prior to seismic testing those component types for which it has been demonstrated that no significant aging and seismic coupling exists. This paper discusses the aging mechanisms which were simulated, the components which were tested, the seismic testing performed and the conclusions of this series of testing.

20590 (NUREG/CP—0036, pp 217-228) **Case for non-material specific thermal aging.** Bessey, R.L. (Southwest Research Inst., San Antonio, TX). Nov 1982. NTIS, PC A13/MF A01 - GPO.

From Workshop on nuclear power plant aging; Bethesda, MD, USA (4 Aug 1982).

The state-of-the-art model for accelerated thermal aging of components prior to seismic testing is the Arrhenius Model. The most pertinent independent variable in the equation is the minimum activation energy constant characterizing the component aging. With minor exceptions, existing measured values of the activation energy constant are inadequate as input to the model where a material specific aging acceleration factor is to be determined, for reasons described. The model itself is not very accurate. A case is made for a statistically justified minimum activation energy constant which is not material specific. The advantages of this are assessed. The major advantage is that this would provide the industry with a practical and uniform aging method that is consistent with the accuracy of the model.

20591 (NUREG/CP—0036, pp 231-242) **Considerations in the thermal aging analysis of safety-realted power equipment.** Lieberman, P.; Wood, S.H. (National Technical Systems, Alexandria, VA). Nov 1982. NTIS, PC A13/MF A01 - GPO.

From Workshop on nuclear power plant aging; Bethesda, MD, USA (4 Aug 1982).

There are several approaches to aging analysis in the qualification of nuclear power plant equipment in accord with IEEE and NRC standards and regulations. The importance of analysis as a technique in the aging step of nuclear environmental qualification results from the fact that industry is frequently faced with limited time to qualify a nuclear component or system, inadequate budgeted funding to perform an elaborate test program, and equipment that is already in place and in service that is required to meet new regulatory requirements. Full utilization of the analysis approaches to aging will assist the nuclear power industry in solving many of its problems in meeting these new requirements.

20592 (NUREG/CP—0036, pp 256-262) **Effects of simultaneous exposures to heat and radiation on insulation life.** Campbell, F.J. (Naval Research Lab., Washington, DC). Nov 1982. NTIS, PC A13/MF A01 - GPO.

From Workshop on nuclear power plant aging; Bethesda, MD, USA (4 Aug 1982).

The capability for predicting service life of an insulating material from test procedures based upon thermal aging alone becomes much more complex when the aging is conducted in an environment of heat and radiation combined. The life of an insulating material which will be used in radiation environment cannot be predicted by the usual thermal-aging methods; neither can it be predicted from experiments in which thermal aging follows a pre-exposure to radiation at room temperature, or vice versa. To have any reliable significance, the experiment must be conducted in a combined environment of both heat and radiation. At the Naval Research Laboratory an apparatus has been designed and used to achieve this exposure condition. Initial studies with this facility have demonstrated that in environments combining radiation with high temperatures, the life of magnet wire insulating materials is far different from that obtained in individual environments or from sequential exposures to each environment. Each material is affected differently, with some showing an accelerated degradation while others have a longer life in some environmental combinations.

20593 (NUREG/CP—0036, pp 263-268) **Aging of electrical equipment.** Bernstein, B.S. (Electric Power Research Inst., Washington, DC). Nov 1982. NTIS, PC A13/MF A01 - GPO.

From Workshop on nuclear power plant aging; Bethesda, MD, USA (4 Aug 1982).

Approaches employed to attempt to predict the life of electrical equipment out to 40 years, in a nuclear environment, are compared to what the Electrical Systems Division of the Electric Power Research Institute is facing with respect to high voltage cables and power transformers. Discussion includes where the Arrhenius relationship is valid, why it is not valid in most (but not all) cases relating to equipment aging, and how alternate approaches to life prediction are developed.

20594 (NUREG/CR—2878) **Detection of small-sized near-surface under-clad cracks for reactor pressure vessels.** Taylor, T.T.; Crawford, S.L.; Doctor, S.R.; Posakony, G.J. (Pacific Northwest Lab., Richland, WA (USA)). Feb 1983. Contract AC06-76RL01830. 31p. (PNL—4373). NTIS, PC A03/MF A01 - GPO $4.50. Order Number DE83008557.

The analysis of pressurized thermal shock (PTS) shows it is necessary for nondestructive evaluation to demonstrate high probability of detecting evaluation to demonstrate high probability of detecting cracks 0.250 inches deep and deeper at the clad/base metal interface. Ultrasonic techniques developed and used in Europe are evaluated in this paper for their applicability to US reactor pressure vessels for detecting cracks of interest for PTS. Flaw detectability experiments were carried out by testing the inspection technique's ability to detect artificial flaws under several types of clad, including some Manual Metal Arc (MMA) clad. Both ground and unground clad surfaces were evaluated. Crack sizing tests of the inspection technique were made using a crack tip diffraction technique.

20595 **Reactor component automatic grapple.** Greenaway, P.R. (to Dept. of Energy). US Patent 4,362,692. 7 Dec 1982. Filed date 3 Nov 1980. vp.

PAT-APPL-203307.

A grapple for handling nuclear reactor components in a medium such as liquid sodium which, upon proper seating and alignment of the grapple with the component as sensed by a mechanical logic integral to the grapple, automatically seizes the component. The mechanical logic system also precludes seizure in the absence of proper seating and alignment.

20596 **Heat transfer system.** Mcguire, J.C. (to Dept. of Energy). US Patent 4,343,763. 10 Aug 1982. Filed date 7 Mar 1980. vp.

PAT-APPL-128203.

A heat transfer system for a nuclear reactor is described. Heat transfer is accomplished within a sealed vapor chamber which is substantially evacuated prior to use. A heat transfer medium, which is liquid at the design operating temperatures, transfers heat from tubes interposed in the reactor primary loop to spaced tubes connected to a steam line for power generation purposes. Heat transfer is accomplished by a two-phase liquid-vapor-liquid process as used in heat pipes. Condensible gases are removed from the vapor chamber through a vertical extension in open communication with the chamber interior.

2203 Fuel Elements

20597 **(ANL/NESC—256) MANTA; steady-state thermal-hydraulic analysis.** Stedwell, M.J. (General Electric Co., San Jose, CA (USA). Nuclear Energy Div.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048256.

Maxima of - 200 nodes 1 to 100 internal nodes 101 to 150 surface nodes 48 coolant nodes 24 coolant channels 20 segments 6 connections per node except for the coolant nodes which have 5; .

MANTA is a program which provides a thermal-hydraulic nodal analysis in the steady state. It was designed to analyze fuel element configuration in the superheat development program. MANTA analyzes mixing between coolant channels, allows for temperature variant conductivity in admittance calculations, and multiple stacked segments through the fuel region for a 7-element cluster analysis over a length of up to 8 feet. MANTA is designed for single-pass steam flow. The flow direction in the coolant channels may be either up or down, thereby permitting the analysis of two-pass as well as single-pass fuel elements. MANTA accounts for the heat transfer and pressure drop that may occur between coolant channels due to mixing as well as to the conventional heat transfer and pressure drop relationships due to friction, discontinuities, acceleration, convection, conduction, and radiation. MANTA allows for the calculation at each node of the material properties viscosity, specific heat, conductivity, and specific volume to correspond to the actual node temperature being solved for. The CDC6600 version uses sodium for the working fluid rather than steam.GE635;CDC6600,7600; FORTRAN IV; GECOS (GE635) and SCOPE (CDC6600); 35K GE635, with 3 scratch tapes.

20598 **(ANL/NESC—257) REAX; resolved resonance epithermal cros sectionss.** Protsik, R. (General Electric Co., Sunnyvale, CA (USA). Advanced Products Operation). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048257.

Maxima of - 5 fuel temperatures 5 moderating materials 3 fuel isotopes 30 first fertile isotope resonances 10 second fertile isotope resonances 80 fissile isotope resonances.

REAX calculates epithermal flux, activities and cross sections as a function of radius and energy for a constant temperature fuel rod immersed in a homogeneous medium.GE635; FORTRAN IV; GE635 GECOS; 35K GE635 with input and output media.

20599 **(ANL/NESC—266R) CYGRO2; stress analysis of cylindrical fuel element.** Friedrich, C.M.; Guilinger, W.H. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048266.

CYGRO2 is used to determine stresses and strains during steady-state and transient power operation of an oxide-fueled, metal-clad rod-type fuel element in a pressurized environment. Major loading conditions include fuel swelling, fission gas and coolant pressure, clad growth and differential thermal expansion. The application for which the program has been developed is zircaloy tubes containing bulk oxide fuel. Axial and azimuthal symmetry of temperature and stresses is assumed.CDC6600; FORTRAN IV; SCOPE.

20600 **(ANL/NESC—272R) FIGRO; LWBR fuel swelling temperature study.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Sphar, C.D. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048272.

Each fuel zone may be subdivided into a maximum of 50 concentric equal-thickness annuli for the calculation of temperature and fuel growth (3302 cards) Sample problem (37 cards) Sample problem output (13 pages) Reference report, WAPD-TM-618, and Addenda.

FIGRO calculates the one-dimensional steady-state temperature distribution and total fuel swelling for metal-clad, axisymmetric, bulk-oxide cylindrical fuel elements. The fuel pellet may be solid, annular, or contain two radial zones. Oxide fuel thermal conductivity is a function of temperature, depletion, and porosity. Fuel swelling is a function of temperature, depletion, internal hydrostatic pressure, and fissioning rate. Fuel-clad gap conductance is a function of gas composition, temperature, and gap thickness at operating conditions. Either the clad surface flux or the temperature at the inside radius of the fuel may be specified as a boundary condition for the heat conduction equation. Thermal expansion of the fuel and cladding is accounted for. Transient temperature calculations can then be performed starting from the steady-state solution with user-specified heat generation and water temperature tables.CDC6600; FORTRAN IV; SCOPE 3.1.

20601 **(ANL/NESC—285R) RESQ2;RESQ0;DBFL; resonance integral for a hexagonal cell.** Anderson, B.L. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048285.

Resonance isotopes are lumped together with an averaged mass. Maximum number of energy points = 8001. Maximum number of isotopes = 15.

RESQ2 calculates the resonance integral in a two-dimensional, hexagonal system consisting of fuel, clad and water with a reflecting boundary condition.CDC6600; FORTRAN IV (98%) and ASCENT (2%); SCOPE 2.0; 40K memory, one tape for the library tape, one tape or disk for scratch.

20602 **(ANL/NESC—301) FREVAP6; HTGR metallic fission product release.** Pierce, V.H. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048301.

MMaxima of - isotopes 10 time intervals for time-dependent variable 49 segments (times number of isotopes) 5 different output print time steps.

The FREVAP type of code for estimating the release of longer-lived metallic fission products from HTGR fuel elements has been developed to take into account the combined effects of the retention of metallic fission products by fuel particles and the rather strong absorption of these fission products by the graphite of the fuel elements. Release calculations are made on the basis that the loss of fission product nuclides such as strontium, cesium, and barium is determined by their evaporation from the graphite surfaces and their transpiration induced by the flowing helium coolant. The code is devised so that changes of fission rate (fuel element power), fuel temperature, and graphite temperature may be incorporated into the calculation. Temperature is quite important in determining release because, in general, both release from fuel particles and loss by evaporation (transpiration) vary exponentially with the reciprocal of the absolute temperature.UNIVAC1108; FORTRAN IV; EXEC2, GAX27; 64K memory with 2 tapes (I/O).

20603 (ANL/NESC—362) WELWING; material buckling cylindrical fuel elements. Grosskopf, O.G.P. (South African Atomic Energy Board, Pretoria). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048362.

Up to 32 different materials in the fuel element may be used.

WELWING was developed to calculate the material buckling of reactor systems consisting of annular fuel elements in heavy water as moderator for various moderator to fuel ratios. The moderator to fuel ratio for the maximum material buckling for the particular system is selected automatically and the corresponding material buckling is calculated.IBM360; FORTRAN IV; OS/360.

20604 (ANL/NESC—424R) GLUB1; water-logged fuel element analysis. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy, J.H.; Meyer, J.E. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048424.

For each metal property, up to 10 values versus temperature can be put in. If power or defect enthalpy is to be input, up to 30 values versus time can be given. Finally, in order to obtain allowable power as a function of defect diameter, up to 10 different diameters can be put in.

GLUB1 solves the waterlogging transient caused by the existence of a fuel element cladding defect during an increase in power. The power is either - case 1, put in as an arbitrary function of time, or case 2, assumed to be a series of linear ramps to a new steady-state with steeper and steeper slopes. All the geometry and metal properties are input quantities. Water properties are obtained from internal tables. Clad and fuel thermal, stress, and strain computations are performed. The output consists of internal pressure and defect flow. For case 1, the clad stress versus time is printed, and for case 2 the steady-state power value which causes clad failure is printed.CDC6600; FORTRAN IV; SCOPE; 60,000 octal locations.

20605 (ANL/NESC—432) COBRA4I; rod bundle & core thermal-hydraulics. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Sutey, A.M. [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048432.

Using the COBRA4I code option to store variables on peripheral storage devices eliminates any practical limit as to maximum problem size. However, computer core requirements and code execution time is always a consideration when determining the complexity of the problem to be solved.

COBRA4I performs steady-state and transient thermal-hydraulic analysis of rod bundle nuclear fuel elements and cores via the subchannel analysis method.CDC6600,7600,CYBER175;CRAY1; FORTRAN IV; SCOPE (CDC6600,7600), NOS (CDC CYBER175), COS (CRAY1); 202,000 (octal) words and 4 scratch units besides the standard input/output units..

20606 (ANL/NESC—449R) CYGRO3; oxide fuel rod stress & deformation. Duncombe, E.; Friedrich, C.M. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048449.

Maximum of - 30 rings (fuel plus clad).

CYGRO3 is an extensive modification of CYGRO1 and CYGRO2. Basically the program calculates temperatures, deformation, and stresses in cladded fuel rods as a function of a history of power and coolant conditions. Axial and circumferential uniformity are assumed. Bubble growth and migration are included. The main changes from CYGRO1 and CYGRO2 are in the area of void migration, fuel cracking, clad collapse, representation of in-pile creep and clad anisotropy.CDC6600;IBM360,370; FORTRAN IV (CDC6600), FORTRAN IV and Assembly language (IBM360); SCOPE (CDC6600), OS/360,370 (IBM360,370); 140,000 (octal) words.

20607 (ANL/NESC—460R) LIFE3; mixed-oxide fuel element performance. Billone, M.C. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048460.

The LIFE3 computer code was developed to calculate the thermal and mechanical response of mixed-oxide fuel elements in a fast-reactor environment. It incorporates a one-dimensional, steady-state heat-transfer analysis and a finite-strain-theory structural analysis based on generalized plane strain and the method of successive elastic solutions. An incremental approach is used so that temperatures, stresses, and strains can be calculated during any specified history of reactor power cycling. Fuel-cladding and sodium-cladding chemical attack is treated by a cladding wastage model. Up to six axial sections are allowed to account for axial variations in power and coolant temperature. Fuel restructuring; migration of fabricated and swelling porosities; fuel and cladding thermal expansion, elasticity, swelling, and creep; fission-gas release; and fuel cracking, crack healing, and hot pressing are included in the analysis. LIFE3 is the reference ERDA code for calculating the performance of fast breeder reactor fuel elements under normal operating conditions, including power cycling.IBM370;CDC7600; FORTRAN IV; OS/370 (IBM370), SCOPE 2.1 (CDC7600); 325K bytes of memory (IBM370/195) and 125,000 (octal) words (CDC7600) with one scratch file and one file for restart information, in addition to the system input and output units.

20608 (ANL/NESC—468R) BUBL1; fuel swelling & gas release simulation. Warner, H.R. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048468.

The current version of BUBL1 is restricted to isothermal problems with non-varying hydrostatic pressure and thermal gradient histories.

BUBL1 predicts fuel swelling and fission gas release from nuclear fuels, based on movement of fission gas bubbles in solids by a surface diffusion mechanism under the action of a thermal gradient (see reference 3). Interactions of the bubbles with dislocations and grain boundaries provide temporary trapping sites, prior to release.CDC6600; FORTRAN IV; SCOPE 3.1; 65K memory, a printer, and a plotter.

20609 (ANL/NESC—481R) BUSHL; cylindrical shell buckling collapse analysis. Thurman, A.L. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048481.

BUSHL uses only one Fourier component for the circumferential variations of the buckling displacements restricting its applicability to shells of near cylindrical shape. BUSHL is best-suited for problems where the parameter (L**2)/Rt is less than 1500 for cylinders.

BUSHL determines the load at which a finite-length shell of revolution will buckle when subjected to hydrostatic pressure, axial compression, or a combination of the two. Elastic-plastic material properties are used with deformation theory and thin-shell theory to analyze the shell. BUSHL was developed primarily for the buckling collapse analysis of zircaloy-clad oxide fuel rods.CDC6600; FORTRAN IV; SCOPE; Printer, on-line punch, plotter, and a minimum of 100,000 (octal) words storage.

20610 (ANL/NESC—931) SCORE-EVET; three-dimensional hydraulic reactor core analysis. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Kiser, D.M. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048931.

Maxima of - 64 flow channels 40 cells in any one direction (boundary plus real cells) 40 possible loss coefficients For the fuel rod thermal transport model, five nodes are allowed in the fuel and two nodes in the cladding.

SCORE-EVET was developed to study multidimensional transient fluid flow in nuclear reactor fuel rod arrays. The conservation equations used were derived by volume averaging the transient compressible three-dimensional local continuum equations in Cartesian coordinates. No assumptions associated with subchannel flow have been incorporated into the derivation of the conservation equations. In addition to the three-dimensional fluid flow equations, the SCORE-EVET code contains a one-dimensional steady state solution scheme to initialize the flow field, steady state and transient fuel rod conduction models, and comprehensive correlation packages to describe fluid-to-fuel rod interfacial energy and momentum exchange. Velocity and pressure boundary conditions can be specified as a function of time and space to model reactor transient conditions, such as a hypothesized loss-of-coolant accident (LOCA) or flow blockage. The basic volume-averaged transient three-dimensional equations for flow in porous media are solved in their general form with constitutive relationships and boundary conditions tailored to define the porous medium as a matrix of fuel rods. By retaining generality in the form of the conservation equations, a wide range of fluid flow problem configurations, from computational regions representing a single fuel rod subchannel to multichannels, or even regions without a fuel rod, can be modeled without restrictive assumptions. The completeness of the conservation equations has allowed SCORE-EVET to be used, with modification to the constitutive relationships, to calculate three-dimensional laminar boundary layer development, flow fields in large bodies of water, and, with the addition of a turbulence model, turbulent flow in pipe expansions and tees.CDC7600,CYBER175; FORTRAN IV; SCOPE 2.1 (CDC7600), NOS 1.3 (CDC CYBER175); 200,000 (octal) words of memory are required for execution.

20611 (CONF-820360—3) Correlation between fuel structure and mechanical properties of UO_2. Blank, H.; Mandler, R.; Matzke, H.; Routbort, J.; Werner, P. (Commission of the European Communities, Karlsruhe (Germany, F.R.). European Inst. for Transuranium Elements; Argonne National Lab., IL (USA)). Oct 1982. Contract W-31-109-ENG-38. 21p. NTIS, PC A02. Order Number DE83007631.

From IAEA specialists meeting on water reactor fuel element performance computer modelling; Preston, UK (14 Mar 1982).

The relation between the structure of a UO_2 fuel and its mechanical properties are discussed and illustrated for particular types of UO_2 by measurements of fracture surface energy, hardness, fracture stress and of compressive deformation at 1870 and 1970°K. This gives the background for treating the question whether it is possible to find a simple experimental method for correlating the mechanical properties of UO_2 before irradiation with those after various irradiation histories. Hardness measurements might be such a method if combined with a detailed structural analysis and sufficient knowledge about the irradiation history.

20612 (EPRI-EL—2797-Vol.1) Probabilistic approach to stability analysis. Volume 1. Mathematical models, computing methods, and results. Final report. Anderson, P.M.; Bose, A.; Timo, K.J.; Villaseca, F.E. (Arizona State Univ., Tempe (USA). Dept. of Electrical and Computer Engineering). Jan 1983. 462p. NTIS, PC A20/MF A01. Order Number DE83901466.

The objective of this project was to investigate the application of probabilistic methods for use in power system analysis and to develop preliminary computer methods for evaluation and testing. Power system stability has traditionally been evaluated using deterministic techniques. In this method of analysis the engineer selects a particular location on the network where he places a predetermined disturbance. The disturbance is programmed to exist for a given time, usually a few cycles, and the stability program solves the system response to this particular upset. The results transient behavior will permit the engineer to determine stability or instability, but gives no information regarding the likelihood of this result. Thus, any evaluation that involves a large expenditure to prevent this given instability must be tempered by judgement regarding its probability of occurrence. This project provides a means of evaluating both the stability and its probability of occurrence. There are many problems in this step into probabilistic evaluation. One must first develop a method of describing the disturbance events (fault location, type, and duration) probabilistically, and do so within the bounds of a mathematically, rigorous framework. This has been accomplished. The second useful result that has been obtained is a probabilistic description of the power system relaying system and its performance. Finally, solution methods are presented whereby disturbances can be generated probabilistically and the probability of stability determined. The subject approached in this work is difficult and much remains to be done to provide a complete working simulation. The preliminary results, however, are encouraging.

20613 Nuclear reactor fuel assembly duct-tube-to-handling-socket attachment system. Christiansen, D.W.; Smith, B.G. (to Dept. of Energy). US Patent 4,366,116. 28 Dec 1982. Filed date 5 Mar 1981. vp.

PAT-APPL-240676.

A reusable system for removably attaching the upper end of a nuclear reactor duct tube to the lower end of a nuclear reactor fuel assembly handling socket. A transition ring, fixed to the duct tube's upper end, has an interior-threaded section with a first locking hole segment. An adaptor ring, fixed to the handling socket's lower end has an outsithreaded section with a second locking hole segment. The inside and outside threaded sections match and can be joined so that the first and second locking hole segments can be aligned to form a locking hole. A locking ring, with a locking pin, slides over the adaptor ring so that the locking pin fits in the locking hole. A swage lock or a cantilever finger lock is formed from the locking cup collar to fit in a matching groove or in the locking ring prevent the locking ring's locking pin from backing out of the locking hole.

20614 Retrievable fuel pin end member for a nuclear reactor. Rosa, J.M. (to Dept. of Energy). US Patent 4,344,914. 17 Aug 1982. Filed date 6 Aug 1980. vp.

PAT-APPL-175814.

A bottom end member on a retrievable fuel pin secures the pin within a nuclear reactor by engaging on a transverse attachment rail with a spring clip type of action. Removal and reinstallation if facilitated as only axial movement of the fuel pin is required for either operation. A pair of resilient axially extending blades are spaced apart to define a slot having a seat region which receives the rail and having a land region, closer to the tips of the blades which is normally of less width than the rail. Thus an axially directed force sufficient to wedge the resilient blades apart is required to emplace or release the fuel pin such force being greater than the axial forces on the fuel pins which occur during operation of the reactor.

20615 Nuclear reactor fuel rod attachment system. Christiansen, D.W. (to Dept. of Energy). US Patent 4,344,915. 17 Aug 1982. Filed date 17 Sep 1980. vp.

PAT-APPL-187913.

A reusable system is described for removably attaching a nuclear reactor fuel rod to a support member. A locking cap is secured to the fuel rod and a locking strip is fastened to the support member. The locking cap has two opposing fingers shaped to form a socket having a body portion. The locking strip has an extension shaped to rigidly attach to the socket's body portion. The locking cap's fingers are resiliently deflectable. For attachment, the locking cap is longitudinally pushed onto the locking strip causing the extension to temporarily deflect open the fingers to engage the socket's body portion. For removal, the process is reversed.

20616 **Elevated temperature long-term air oxidation of Inconel alloy 625.** Purohit, A.; Barth, M.M. (Argonne National Laboratory, 9700 S. Cass Avenue, Argonne, IL 60439). *Transactions of the American Nuclear Society;* **41**: 292-294(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

2204 Control Systems

REFER ALSO TO CITATION(S) 21565

20617 **(CONF-810701—7) Utility of low-order linear nuclear-power-plant models in plant diagnostics and control.** Tylee, J.L. (EG and G Idaho, Inc., Idaho Falls (USA)). 1981. Contract AC07-76ID01570. 5p. NTIS, PC A02/MF A01. Order Number DE83008449.

From Computer simulation conference; Washington, DC, USA (15 Jul 1981).

A low-order, linear model of a pressurized water reactor (PWR) plant is described and evaluated. The model consists of 23 linear, first-order difference equations and simulates all subsystems of both the primary and secondary sides of the plant. Comparisons between the calculated model response and available test data show the model to be an adequate representation of the actual plant dynamics. Suggested use for the model in an on-line digital plant diagnostics and control system are presented.

20618 (NUREG/CP—0034-Vol.1, pp 148-161) **Control-rod parametrical studies in the framework of the PRE-RACINE and RACINE programs.** Humbert, G. (Centre d'Etudes Nucleaires, Cadarache, France); Ruelle, B.; Daguzan, G.; Stanculescu, A.; Kappler, F.; Scholtyssek, W.; Bouscavet, D.; Martini, M.; Broccoli, U. Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

A control-rod experimental program is presented. This program, established in the frame of PRE-RACINE and RACINE common DEBENE, Italian and French experiments at MASURCA facility, is still under progress at the moment. The results, limited to single central rod worth are already available. For these experiments, a parametrical approach has been used. The effects of rod worth, varied separatly by rod side, boron enrichment and core size, on experiment to calculation relative discrepancy (E-C)/C can be drawn out.

20619 (NUREG/CP—0034-Vol.1, pp 162-176) **Control-rod calculation methods and uncertainties for a power LMFBR design.** Salvatores, M. (Centre d'Etudes Nucleaires de Cadarache, Saint-Paul-Lez-Durance, France); Giacometti, C.; Palmiotti, G.; Rado, V.; Lyon, F. Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

The present paper summarizes the control-rod calculation methods used at CEA for large fast power reactor design. The standard design method and correction factors due to transport heterogeneity of the control-rod subassembly, number of energy groups and calculation mesh size effects, are defined, with their associated uncertainties.

20620 **(NUREG/CR—3103) Predictor display concepts for use in nuclear-plant control.** Venhuizen, J.R.; Griffith, J.M. (EG and G Idaho, Inc., Idaho Falls (USA)). Jan 1983. Contract AC07-76ID01570. 28p. (EGG—2235). NTIS, PC A03/MF A01 - GPO. Order Number DE83007882.

The concept of predictor displays is introduced for use in a nuclear power plant control environment. [A predictor display is defined as a display on a cathode ray tube (CRT) giving the status of a portion of the plant at some future time as predicted by computer simulation.] Properties of the predictor are given, and direct relationships between supervisory control, optimal estimation theory, and prediction are presented. Two examples of predictor displays are included: steam generator water level and primary system coolant inventory. Additional research is recommended to determine the ultimate value of predictor displays in a nuclear power plant control environment.

20621 **Nuclear reactor control column.** Bachovchin, D.M. (to Dept. of Energy). US Patent 4,343,764. 10 Aug 1982. Filed date 28 Apr 1980. vp.

PAT-APPL-144748.

The nuclear reactor control column comprises a column disposed within the nuclear reactor core having a variable cross-section hollow channel and containing balls whose vertical location is determined by the flow of the reactor coolant through the column. The control column is divided into three basic sections wherein each of the sections has a different cross-sectional area. The uppermost section of the control column has the greatest crossectional area, the intermediate section of the control column has the smallest cross-sectional area, and the lowermost section of the control column has the intermediate cross-sectional area. In this manner, the area of the uppermost section can be established such that when the reactor coolant is flowing under normal conditions therethrough, the absorber balls will be lifted and suspended in a fluidized bed manner in the upper section. However, when the reactor coolant flow falls below a predetermined value, the absorber balls will fall through the intermediate section and into the lowermost section, thereby reducing the reactivity of the reactor core and shutting down the reactor.

2205 Environmental Aspects

REFER ALSO TO CITATION(S) 20289, 20405, 20663, 20718, 20721, 21658, 21808

20622 **(ANL/NESC—172) AISITE2; parametric site requirement study.** Blaine, R.A. (Atomics International, Canoga Park, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048172.

Maxima of - 100 isotopes 20 distances 10 values of variable parameter 8 organs 4 levels of containment.

AISITE2 is largely based on methods proposed by the AEC in TID-14844 but differs in certain of the assumptions and models. The code automatically varies any one of 46 parameters such as reactor power, building leak rate, iodine clean-up rate, and halogen filter efficiency, computing the exclusion area, and low population boundary zones as functions of that parameter. The edit includes dose vs. distance data, fractional contribution by isotope group to the inhalation dose, and critical distances providing both printed and graphical data. Three models are available for fission product release with up to four levels of containment.IBM360; FORTRAN IV; OS/360; 256K bytes storage.

20623 **(NP—3901553) Fort St. Vrain Nuclear Generating Station Environmental Radiation Surveillance Program. Summary report, third and fourth quarters, July-December 1982.** Johnson, J.E. (Colorado State Univ., Fort Collins (USA)). 23 Feb 1983. 135p. Public Service Company of Colorado, 2420 W. 26th Ave., Suite 100D, Denver, CO 80211.

During the second half of 1982 the Fort St. Vrain Nuclear Generating Station produced power of 2.4 x that in the previous 6 month reporting period. The reactor did not operate during the first 3.5 months of 1982. Radioactivity released by normal effluent routes, however, was not negligible during the shut down period. This is due to scheduled clean-up and maintenance operations. A complete and detailed listing of radioactivity released by all effluent routes may be found in the Public Service Company of Colorado semi-annual Effluent Release Report to the U.S.N.R.C. When possible in this report any correlation of radioactivity in environmental samples with the effluent release data is discussed. The environmental sampling and analysis program was essentially identical to that used in the most recent reporting periods. Essentially all radioactivity data measured on this project are near background levels and, more importantly, near the minimum detectable activity (MDA) levels for each radionuclude and sample type.

20624 (ORNL/Sub—7468-13-Vol.1) Conceptual Nuclear Energy Center at Green River, Utah. Volume 1. Environmental impacts. (Science Applications, Inc., Salt Lake City, UT (USA)). Jan 1982. Contract W-7405-ENG-26. 311p. NTIS, PC A14/MF A01. Order Number DE83006838.

Information is presented concerning air resources, water resources, ecological resources, cultural resources, land uses, project description, atmospheric impacts, hydrology and water quality impacts, ecological impacts, cultural impacts, land use impacts, transmission impacts, composite impact analysis, and mitigation measures.

20625 (ORNL/SUB—7846/2) Study of a conceptual nuclear energy center at Green River, Utah. Power demand, load center assessment and transmission. Smith, D.R.; Thaik, A.; Pingel, P. (Gilbert Associates, Inc., Reading, PA (USA)). Feb 1982. Contract W-7405-ENG-26. 146p. NTIS, PC A07/MF A01. Order Number DE83006351.

This document constitutes a segment of a feasibility study investigating the ramification of constructing a nuclear energy center in an arid western region. In this phase of the study. The projected power demands and load center locations were reviewed and assessed. Alternative transmission systems were analysed and a conceptual transmission for bulk power transportation is proposed with potential line routes. Environmental impacts of the proposed transmission were also identified.

20626 (ORNL/Sub—7846/3) Study of a conceptual nuclear energy center at Green River, Utah. Site selection. (NUS Corp., San Francisco, CA (USA). Western Engineering Operations). Aug 1981. Contract W-7405-ENG-26. 82p. NTIS, PC A05/MF A01. Order Number DE83006352.

The siting requirements are described for a NEC. The methodology used, primary and secondary screening criteria and the results and conclusions are also presented. Appended to the report are detailed discussions of two siting factors, and evaluation of Nuclear Regulatory Commission (NRC) demographic siting criteria and a fatal flaw analyses for terrestrial and aquatic ecology.

20627 (ORNL/Sub—7846/12) Socioeconomic impacts: study of a conceptual nuclear energy center at Green River, Utah. Weaver, R.; Taylor, J.; Burnett, K.; Greenberg, B. (Utah Univ., Salt Lake City (USA). Bureau of Economic and Business Research). Feb 1982. Contract W-7405-ENG-26. 212p. NTIS, PC A10/MF A01. Order Number DE83006834.

This document constitutes a segment of a feasibility study investigating the ramifications of constructing a nuclear energy center (NEC) in an arid western region. In this phase of the study, the impacts on socioeconomic conditions in the surrounding communities and possible ways of financing and mitigating these impacts were examined. The general conclusion reached is that the socioeconomic impacts of a nuclear energy center in the Green River area of Southeastern Utah would not impose an absolute bar to NEC development. The economy of the NEC impact area would be substantially transformed by the NEC. In particular, Green River city itself would change from its current status as a relatively stable rural economy with an agricultural, mining, and recreation base to a major city with over 20,000 permanent relatively high income residents. The NEC, by itself, would provide a tax base more than adequate to finance required expansion of public facilities and public human service provisions.

20628 (PB—82-225046) Plume diffusion modeling: annual report to the Nuclear Regulatory Commission. (National Oceanic and Atmospheric Administration, Silver Spring, MD (USA). Air Resources Lab.). Sep 1980. 115p. NTIS, PC A06/MF A01.

After a brief summary of progress, four reports are presented as follows: Effects of Release Height on Sigma sub y and Sigma sub z, by S.R. Hanna; What Convective Scaling Does for Diffusion Data, by G.A. Briggs; Study of the Horizontal Diffusion Length, Sigma sub y, by F.A. Gifford; and Representativeness of Meteorological Observations, by C.J. Nappo.

20629 (PB—82-229287) Atmospheric releases from standardized nuclear power plants: A wind tunnel study. Fluid modeling report No. 12. Payne, A.W.; Snyder, W.H. (Environmental Protection Agency, Research Triangle Park, NC (USA). Environmental Sciences Research Lab.). Apr 1982. 72p. NTIS, PC A04/MF A01.

Laboratory experiments were conducted to simulate radiopollutant effluents released to the atmosphere from two standard design nuclear power plants. The main objective of the study was to compare the dispersion in the wake of the standardized nuclear power plants with that in a simulated atmospheric boundary layer. A large meteorological wind tunnel was used to simulate a suburban atmospheric boundary layer. The model-prototype scale was 1:300 and the roughness length was approximately 1.0 m full scale. The model boundary layer simulated full scale dispersion from ground level and elevated release points over surfaces of comparable roughness length.

20630 (PB—82-236670) The socio-environmental impacts of energy development on local user groups and water resources planning. Wisniewski, R.L.; Freudenburg, W.R. (Washington State Univ., Pullman (USA)). Oct 1981. 133p. NTIS, PC A07/MF A01.

Assessment was made of the socio-environmental impacts created by the Grays Harbor County twin nuclear power generating plants being constructed by the Washington Public Power Supply System (WPPSS), using a combination of methods. The methods included over 300 interviews conducted in the immediate vicinity of the plants, and another 300 in a comparison area of eastern Pacific County. Five major conclusions were reached: both Counties showed strong opposition to the power plants, and to nuclear power, in general; water quality issues appeared to be a major reason behind the opposition. The results of this study implied that an energy facility builder's action can have significant consequences for local and regional public opinion, which, in turn, can have significant implications for the builder. Public opinion appears to have been strongly affected by a perceived lack of competence on the part of WPPSS and by the perception that WPPSS has failed to devote adequate consideration to local preferences. Public attitudes were not predictable on the basis of economic factors alone.

2206 Research, Test, And Experimental Reactors

REFER ALSO TO CITATION(S) 19831, 20433, 20462, 20677, 20679, 20707, 20727, 20731, 22516

20631 (AD-A—119945/4) Radiation field characterization for the AFRRI TRIGA Reactor. Volume I. Baseline measurements and evaluation of calculational data. Final report 5 May 80-31 Dec 80. Verbinski, V.V.; Ferlic, K.; Cassapakis, C.C.; Daxon, E.; Hagan, W.K. (Science Applications, Inc., La Jolla, CA (USA)). 1 Jun 1981. 50p. NTIS, PC A03/MF A01.

This document summarizes the neutron spectral measurements and the neutron and gamma-ray spectral calculations for five different irradiation geometries commonly employed in biological and semiconductor radiation-damage studies: freefield in both ER1 and ER2 exposure rooms; behind a 2-inch lead wall and inside an exercise wheel; behind a 6-inch lead wall and inside a 2-inch lead cave; and at the center of a tissue-equivalent phantom located behind a 6-inch lead wall.

20632 (ANL/NESC—473R) CHIC-KIN; fast and intermediate power transients. Redfield, J.A. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048473.

Restrictions include - 1 through 20 axial sections 2 through 10 radial sections 2 through 30 mass-velocity or pressure-drop pairs 2 through 30 inlet enthalpy pairs 2 through 30 exit enthalpy pairs 2 through 30 system-pressure pairs.

CHIC-KIN treats fast and intermediate reactivity transients in a water-cooled heterogeneous nuclear reactor. The program calculates the power, temperatures, and internal pressure surges when control rod motion, inlet temperature, inlet flow, and system pressure are known functions of time. The reactor model considered is a single-pass, water-cooled core represented by a single, fuel-element-coolant-passage system with reactivity feedback to the kinetics equations.CDC6600; FORTRAN IV; SCOPE 3.1.

20633 (ANL/NESC—489) TRIFIDO; pulsed neutron source data analysis. Difilippo, F.; Pieroni, N. (Comision Nacional de Energia Atomica, Buenos Aires (Argentina). Dept. de Reactores). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048489.

The code is presently restricted to 256 experimental data points (for example, those provided by a TMC multichannel analyser). This is adequate for most pulsed neutron measurements. The restriction can be easily overcome if necessary by changing a dimension card.

The code calculates the decay constant and the population of the fundamental prompt neutron mode extrapolated to initial time, using pulsed neutron experimental data. These data are the resulting time profile of the neutron density of a subcritical multiplicative assembly which is repetitively pulsed with short bursts of neutrons. The time profile is measured with an appropriate detector and recorded with a time analyser. With the calculated parameters the code determines the values of (k*beta)/L and reactivity by means of the Garelis-Russell method, and reactivities using the Gozani and Sjostrand methods.IBM360; FORTRAN IV; OS/360; 11K words of storage.

20634 (ANL/NESC—510) VIM1;VIM1X; Monte Carlo critical assembly analysis. Levitt, L.B.; Lewis, R.C. (Atomics International Div., Canoga Park, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048510.

VIM1 is restricted to critical assemblies of the plate drawer type, and the energy range must be between 10 MeV and 10 eV.

VIM1 is a Monte Carlo code designed for the analysis of fast critical experiments. It has been expressly prepared for the analysis of fast critical assemblies of the plate-drawer type such as ZPPR, ZPR-3, and ZEBRA. The library uses point cross section data, rather than multigroup constants.CDC7600;IBM360; FORTRAN IV (CDC7600), FORTRAN IV and BAL (IBM360); SCOPE 1.1 (CDC7600) and OS/360 (IBM360); 65K (decimal) fast central memory, 80K ECS, and 1 magnetic tape unit are required on the CDC7600. 650K bytes and 2 tape units are required on the IBM360.

20635 (CONF-811215—13) TREAT neutron-radiography facility. Harrison, L.J. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 7p. NTIS, PC A02/MF A01. Order Number DE83007933.

From World conference on neutron radiography; San Diego, CA, USA (7 Dec 1981).

The TREAT reactor was built as a transient irradiation test reactor. By taking advantage of built-in system features, it was possible to add a neutron-radiography facility. This facility has been used over the years to radiograph a wide variety and large number of preirradiated fuel pins in many different configurations. Eight different specimen handling casks weighing up to 54.4 t (60 T) can be accommodated. Thermal, epithermal, and track-etch radiographs have been taken. Neutron-radiography service can be provided for specimens from other reactor facilities, and the capacity for storing preirradiated specimens also exists.

20636 (CONF-820406—25) Experimental Breeder Reactor II (EBR-II) Fuel-Performance Test Facility (FPTF). Pardini, J.A.; Brubaker, R.C.; Veith, D.J.; Giorgis, G.C.; Walker, D.E.; Seim, O.S. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 10p. NTIS, PC A02/MF A01. Order Number DE83007825.

From Topical meeting on fast, thermal and fusion reactor experiments; Salt Lake City, UT, USA (12 Apr 1982).

The Fuel-Performance Test Facility (FPTF) is the latest in a series of special EBR-II instrumented in-core test facilities. A flow control valve in the facility is programmed to vary the coolant flow, and thus the temperature, in an experimental-irradiation subassembly beneath it and coupled to it. In this way, thermal transients can be simulated in that subassembly without changing the temperatures in surrounding subassemblies. The FPTF also monitors sodium flow and temperature, and detects delayed neutrons in the sodium effluent from the experimental-irradiation subassembly beneath it. This facility also has an acoustical detector (high-temperature microphone) for detecting sodium boiling.

20637 (CONF-820406—26) In-situ material-motion diagnostics and fuel radiography in experimental reactors. DeVolpi, A. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 13p. NTIS, PC A02/MF A01. Order Number DE83007807.

From Topical meeting on fast, thermal and fusion reactor experiments; Salt Lake City, UT, USA (12 Apr 1982).

Material-motion monitoring has become a routine part of inpile transient reactor-safety experiments. Diagnostic systems, such as the fast-neutron hodoscope, were developed for the purpose of providing direct time-resolved data on pre-failure fuel motion, cladding-breach time and location, and post-failure fuel relocation. Hodoscopes for this purpose have been installed at TREAT and CABRI; other types of imaging systems that have been tested are a coded-aperture at ACRR and a pinhole at TREAT. Diagnostic systems that use penetrating radiation emitted from the test section can non-invasively monitor fuel without damage to the measuring instrument during the radiographic images of test sections installed in the reator. Studies have been made of applications of hodoscopes to other experimental reactors, including PBF, FARET, STF, ETR, EBR-II, SAREF-STF, and DMT.

20638 (CONF-820649—3) Image processing and resolution restoration of fast-neutron hodoscope data. Rhodes, E.A.; DeVolpi, A. (Argonne National Lab., IL (USA)). 24 Jan 1982. Contract W-31-109-ENG-38. 22p. NTIS, PC A02/MF A01. Order Number DE83007957.

From National Computer Graphics Association conference; Anaheim, CA, USA (13 Jun 1982).

The fast-neutron hodoscope is a cineradiographic device that monitors fuel motion within thick opaque test capsules during radiation transients at the Transient Reactor Test Facility reactor which simulate accident conditions in power reactors. By means of a collimator and detector array, emissive neutron radiographic digital data is collected in time-resolved and static (scan) modes. Data is digitally reconstructed into raidographic images and used directly for quantitative analysis. Spatial resolution is adequate in most cases, but is marginal for a few experiments. Collimator repositioning, scan increment size-reduction, and deconvolution algorithms are being applied to improve resolution of existing collimators.

20639 (CONF-821104—3) Development and transfer of fuel fabrication and utilization technology for research reactors. Travelli, A.; Domagala, R.F.; Matos, J.E.; Snelgrove, J.L. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 6p. NTIS, PC A02/MF A01. Order Number DE83007729.

From 2. international conference on nuclear technology transfer; Buenos Aires, Argentina (1 Nov 1982).

Approximately 300 research reactors supplied with US-enriched uranium are currently in operation in about 40 countries, with a variety of types, sizes, experiment capabilities and applications. Despite the usefulness and popularity of research reactors, relatively few innovations in their core design have been made in the last fifteen years. The main reason can be better understood by reviewing briefly the history of research reactor fuel technology and enrichment levels. Stringent requirements on the enrichment of the uranium to be used in research reactors were considered and a program was launched to assist research reactors in continuing their operation with the new requirements and with minimum penalties. The goal of the new program, the Reduced Enrichment Research and Test Reactor (RERTR) Program, is to develop the technical means to utilize LEU instead of HEU in research reactors without significant penalties in experiment performance, operating costs, reactor modifications, and safety characteristics. This paper reviews briefly the RERTR Program activities with special emphasis on the technology transfer aspects of interest to this conference.

20640 **(CONF-821155—2) Measurements and analysis of critical assemblies for research reactors with mixed enrichments.** Deen, J.R.; Snelgrove, J.L.; Hobbs, R.W. (Argonne National Lab., IL (USA); Oak Ridge National Lab., TN (USA)). 1982. Contract W-31-109-ENG-38. 47p. NTIS, PC A03/MF A01. Order Number DE83007766.

From International meeting on research and test reactor core conversions from HEU to LEU fuels; Argonne, IL, USA (8 Nov 1982).

As part of the RERTR Program whole-core demonstration in the Ford Nuclear Reactor (FNR) at the University of Michigan, data have been obtained which will allow more extensive validation of neutronics methods for whole-core calculations of an equilibrium high-enriched-uranium (HEU) core and a fresh low-enriched-uranium (LEU) core. A series of experiments designed to provide the data needed for these validations has been performed in the Pool Critical Assembly (PCA) at the Oak Ridge National laboratory (ORNL). This paper reports the results of the measurements and of the subsequent validation calculations performed at ANL. Measurements were made on approximately 20 different critical configurations in the PCA during the period June 15 to 26, 1981. The normal PCA fuel elements contained high-enriched uranium (HEU, 93 wt% ^{235}U) while the reduced-enrichment fuel elements, obtained for irradiation testing in the Oak Ridge Research Reactor (ORR) under the fuel demonstration activity of the RERTR Program, contained either medium-enriched uranium (MEU, 45 wt% ^{235}U) or low-enriched uranium (LEU, 19.8 wt% ^{235}U).

20641 **(CONF-821155—3) Performance and fuel-cycle cost analysis of one JANUS 30 conceptual design for several fuel-element-design options.** Nurdin, M.; Matos, J.E.; Freese, K.E. (National Atomic Energy Agency, Jakarta (Indonesia). Research Centre for Nuclear Techniques; Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 20p. NTIS, PC A02/MF A01. Order Number DE83007727.

From International meeting on research and test reactor core conversions from HEU to LEU fuels; Argonne, IL, USA (8 Nov 1982).

The performance and fuel cycle costs for a 25 MW, JANUS 30 reactor conceptual design by INTERATOM, Federal Republic of Germany, for BATAN, Republic of Indonesia have been studied using 19.75% enriched uranium in four fuel element design options. All of these fuel element designs have either been proposed by INTERATOM for various reactors or are currently in use with 93% enriched uranium in reactors in the Federal Republic of Germany. Aluminide, oxide, and silicide fuels were studied for selected designs using the range of uranium densities that are either currently qualified or are being developed and demonstrated internationally. To assess the long-term fuel adaptation strategy as well as the present fuel acceptance, reactor performance and annual fuel cycle costs were computed for seventeen cases based on a representative end-of-cycle excess reactivity and duty factor. In addition, a study was made to provide data for evaluating the trade-off between the increased safety associated with thicker cladding and the economic penalty due to increased fuel consumption.

20642 **(CONF-821155—4) Comparison of calculated quantities with measured quantities for the LEU-fueled Ford Nuclear Reactor.** Bretscher, M.M.; Snelgrove, J.L. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 30p. NTIS, PC A03/MF A01. Order Number DE83007725.

From International meeting on research and test reactor core conversions from HEU to LEU fuels; Argonne, IL, USA (8 Nov 1982).

The Ford Nuclear Reactor (FNR) went critical on December 8, 1981 with 23 LEU fuel elements. Five of these 23 elements were fabricated by CERCA and the others by NUKEM. Since that time a substantial data base of experimental results for LEU cores has been accumulated by the University of Michigan FNR staff. This paper compares some of the experimental data with analytical calculations based, for the most part, on three-dimensional diffusion theory. The critical configuration, control rod worths, axial rhodium reaction rate profiles and thermal flux distributions have been calculated and compared with measurements.

20643 **(CONF-821155—5) Neutronics analysis of the proposed 25-MW leu TRIGA Multipurpose Research Reactor.** Nurdin, M.; Bretscher, M.M.; Snelgrove, J.L. (National Atomic Energy Agency, Jakarta (Indonesia). Research Centre for Nuclear Techniques; Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 34p. NTIS, PC A03/MF A01. Order Number DE83007726.

From International meeting on research and test reactor core conversions from HEU to LEU fuels; Argonne, IL, USA (8 Nov 1982).

More than two years ago the government of Indonesia announced plans to purchase a research reactor for the Puspiptek Research Center in Serpong Indonesia to be used for isotope production, materials testing, neutron physics measurements, and reactor operator training. Reactors using low-enriched uranium (LEU) plate-type and rod-type fuel elements were considered. This paper deals with the neutronic evaluation of the rod-type 25-MW LEU TRIGA Multipurpose Research Reactor (MPRR) proposed by the General Atomic Company of the United States of America.

20644 **(CONF-821155—6) KUCA critical experiments using MEU fuel (II).** Kanda, K.; Hayashi, M.; Shiroya, S.; Kobayashi, K.; Fukui, H.; Mishima, K.; Shibata, T. (Kyoto Univ., Kumatori, Osaka (Japan). Research Reactor Inst.). 1982. Contract W-31-109-ENG-38. 25p. NTIS, PC A02/MF A01. Order Number DE83007724.

From International meeting on research and test reactor core conversions from HEU to LEU fuels; Argonne, IL, USA (8 Nov 1982).

Due to mutual concerns in the USA and Japan about the proliferation potential of highly-enriched uranium (HEU), a joint study program was initiated between Argonne National Laboratory (ANL) and Kyoto University Research Reactor Institute (KURRI) in 1978. In accordance with the reduced enrichment for research and test reactor (RERTR) program, the alternatives were studied for reducing the enrichment of the fuel to be used in the Kyoto University High Flux Reactor (KUHFR). The KUHFR has a distinct feature in its core configuration: it is a coupled-core. Each annular shaped core is light-water-moderated and placed within a heavy water reflector with a certain distance between them.

20645 **(HEDL-TC—1904-Pt.2-Rev.1) FFTF reactor-characterization program: gamma-ray measurements and shield characterization.** Bunch, W.L.; Moore, F.S. Jr. (Hanford Engineering Development Lab., Richland, WA (USA)). Feb 1983. Contract AC06-76FF02170. 94p. NTIS, PC A05/MF A01. Order Number DE83008401.

A series of experiments is to be made during the acceptance test program of the Fast Flux Test Facility (FFTF) to measure the gamma ray characteristics of the Fast Test Reactor (FTR) and to establish the performance characteristics of the reactor shield. These measurements are a part of the FFTF Reactor Characterization Program (RCP). Detailed plans have been developed for these experiments. During the initial phase of the Characteristics Program, which will be carried out in the In-Reactor Thimble (IRT), both active and passive measurement methods will be employed to obtain as much information concerning the gamma ray environment as is practical. More limited active gamma ray measurements also will be made in the Vibration Open Test Assembly (VOTA).

20646 **(NUREG/CP—0034-Vol.1, pp 506-517) Method of monitoring subcritical reactivity during core refueling.** Ombrellaro, P.A.; Harris, R.A. (Westinghouse Hanford Co., Richland, WA). Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

The Modified Source Multiplication (MSM) technique, was used to measure core subcritical reactivity and core compoent reactivity worth during a major refueling of the Fast Flux Test Facility (FFTF) core. Measured results were compared with calculated values as a means of verifying core component changeouts during the refueling. The results demonstrate the accuracy expected from

MSM measurements and show that the technique was veyr effective in monitoring core subcritical reactivity during a refueling in whcih the neutron sources changed significantly and were not uniformly distributed.

20647 (NUREG/CP—0034-Vol.1, pp 518-532) **Energy-dependent plant protection system for the TREAT upgrade reactor.** Bhattacharyya, S.K.; Lipinski, W.C.; Rudolph, R.R.; Wade, D.C. (Argonne Natioanl Lab., IL). Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

A major upgrade of the TREAT reactor is under way to enhance significantly its transient-testing capabilities in support of the LMFBR safety program. Complex power-vs-time histories, spanning time intervals of several seconds and including a burst mode, are to be generated for experiments with up to 37, 0.027 in. diameter LMFBR test pin clusters. The need to meet demanding functional requirements within several major constraints has produced a design that has a relatively small margin between operating and damaging temperature conditions for the TREAT fuel clad. It was, therefore, necessary to design a sophisticated plant protection system that would detect reactivity insertion malfunctions soon after initiation and intercede promptly with scram action, to prevent reactor clad damage. A plant protection system with energy-dependent power level trip set points lowered worst-case clad temperatures by 180°C, as compared with the use of conventional fixed-level trip set points.

20648 (ORNL/TM—8644) **Oak Ridge Research Reactor quarterly report, July, August, and September 1982.** Corbett, B.L.; Lance, E.D. (Oak Ridge National Lab., TN (USA)). Mar 1983. Contract W-7405-ENG-26. 33p. NTIS, PC A03/MF A01. Order Number DE83008139.

The ORR operated at an average power level of 28.3 MW for 63.5% of the time during July, August, and September of 1982. The reactor was shut down on thirty-four occasions, four of which were unscheduled. Reactor downtime needed for refueling, maintenance, research, and checks was higher than normal due to additional time needed for maintenance and research work. The reactor remained available for operation 82.4% of the time. Maintenance activities, both mechanical and instrument, were essentially routine in nature with the exception of the replacement of the HN-1 facility plug.

20649 **EBR-II superheater-disassembly observations.** Penney, W.H.; Brown, H.G.; Buschman, H.W.; Rice, R.E. (Argonne National Laboratory, P.O. Box 2528, Idaho Falls, ID 83401). *Transactions of the American Nuclear Society;* **41**: 300-301(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

2207 Plutonium And Isotope Production Reactors

REFER ALSO TO CITATION(S) 21972

20650 (ORNL/TM—8677) **High flux isotope reactor quarterly report, October through December, 1982.** Hurt, S.S.; Poteet, K.H. (Oak Ridge National Lab., TN (USA)). Mar 1983. Contract W-7405-ENG-26. 20p. NTIS, PC A02/MF A01. Order Number DE83008305.

Routine reactor operation with four end-of-cycle shutdowns, two additional scheduled shutdowns, and three unscheduled shutdowns resulted in an on-stream time of 91.5% for the quarter.

2209 Reactor Safety

REFER ALSO TO CITATION(S) 20274, 20349, 20405, 20561, 20595, 20647, 21353

20651 (AEEW-R—1508) **Degraded-core accidents: review of aerosol behaviour in the containment of a PWR.** Nichols, A.L.; Walker, B.C. (UKAEA Atomic Energy Establishment, Winfrith. Technology Div.). Sep 1981. 42p. Technology Div., AEE, Winfrith, Dorchester, Dorset, England.

Low probability-high consequence accidents have become an important issue in reactor safety studies. Such accidents would involve damage to the core and the subsequent release of radioactive fission products into the environment. Aerosols play a major role in the transport and removal of these fission products in the reactor building containment. The aerosol mechanisms, computer modelling codes and experimental studies used to predect aerosol behaviour in the containment of a PWR are reviewed. There are significant uncertainties inthe aerosol source terms and specific recommendations have been made for further studies, particularly with respect to code development and high density aerosol-fission product transport within closed systems.

20652 (ANL/NESC—265) **RSAC; radiological safety analysis program.** Richardson, L.C. (EG and G Idaho, Inc., Idaho Falls (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048265.

RSAC generates a fission product inventory from a given set of reactor operating conditions and then computes the external gamma dose, the deposition gamma dose, and the inhalation-ingestion dose to critical body organs as a result of exposure to these fission products. Program output includes reactor operating history, fission product inventory, dosages, and ingestion parameters.IBM360; FORTRAN IV and Assembly language; OS/360; 150K bytes and 1 tape drive.

20653 (ANL/NESC—443) **HAA3B; aerosol behavior lognormal model.** Otter, J. (Atomics International Div., Canoga Park, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048443.

Maxima of - 1000 time-steps in lognormal model part 42 discrete radii for leakage distribution calculations 50 leak-rate input values 50 source-rate input values Applicability has been verified for moderate concentrations in moderate-sized vessels, and for limited types of sources, only.

HAA3B was written to provide an engineering method for calculating heterogeneous aerosol behavior and transport following various hypothetical LMFBR accidents. HAA3B evaluates an approximation to the general integro-differential equation which describes aerosol behavior. The physical model includes particle generation, Brownian and gravitational agglomeration, settling, plating, and leakage for spherical particles. The approximation is the requirement that the size distribution function be lognormal.IBM370; FORTRAN IV (H); OS/370 Release 21.6; A logical unit 5 for input, unit 6 for output, unit 16 for a scratch unit, and a card punch. SC-4020 CRT coding is included as comment cards. Storage allocation is less than 150K bytes.

20654 (ANL/NESC—448R) **FLASH6;FLASH4; fully-implicit transient simulation.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Swartele, G.W. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048448.

In FLASH6 (FLASH 4) up to 30 (20) pressure-determining nodes and 60 flow paths are available.

FLASH6 and earlier FLASH programs are used to determine the transient response of a water-cooled reactor or hydraulic system to severe variable pressure operation. As with previous editions, FLASH6 permits the user to model the reactor plant using a flexible combination of control volumes (nodes), connecting flow paths, pumps, and steam generators. A detailed representation of the core region may be obtained by using up to 80 pressure-determining nodes within the core. The core nodes are connected in one-dimensional chains to represent up to 20 core flow paths. A one-dimensional heat conduction model with up to five radial nodes is used to represent the flow of heat from the fuel element to each core fluid node. Thermal resistance of the fuel-clad gap is continuously calculated during the transient as a function of varying gap dimension, temperature, and pressure. Thirty nodes and 60 flow paths are available to model the non-core regions of the plant.IBM360,370;CDC6600,7600; FORTRAN IV; OS/360,370 (IBM360,370), SCOPE 3.3 (CDC6600), SCOPE 1.1 (CDC7600); 250K bytes (IBM360), 144K central memory and 200K ECS or LCM memory (CDC6600 or 7600).

20655 (ANL/NESC—479) FREADM1; fast reactor core accident analysis. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Meinhardt, W.G. (General Electric Co., Sunnyvale, CA (USA). Breeder Reactor Development Operation). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048479.

FREADM1 is restricted to accidents which initiate and propagate uniformly within annular or cylindrical coaxial core regions.

FREADM1 is a fast reactor, multichannel, accident analysis program designed to efficiently simulate a reactor transient from initiation to the point of core disassembly. Models are included for nuclear kinetics (point model), core thermo-hydraulics, voiding, fuel redistribution, failure propagation, programmed reactivity insertion, and the dynamics of primary-system coolant flow. A broad range of assumed accident initiating and propagating activities may be simulated using triggering logic included in the code.GE635; FORTRAN IV; GECOS-III; 24K memory with 3 peripheral storage units.

20656 (ANL/NESC—499) MIRAB;MIRAP; containment system iodine removal. Ritzman, R.L. (Battelle Columbus Labs., OH (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048499.

The code MIRAB is used for BWR reactors and MIRAP is for PWR reactors. The codes calculate the removal of fission product iodine from a dry-type BWR/PWR containment system atmosphere under reactor accident conditions. The method considers the simultaneous removal by natural deposition on surfaces or absorption in water, by engineered spray system operation, by adsorption on filters, and by leakage from the containment. In addition, the simultaneous behavior of three iodine forms is modeled - specifically elemental iodide, methyl iodine, and particulate iodine. The programs generate iodine concentrations and accumulations throughout the containment system as a function of time after start of the accident.CDC6400; FORTRAN IV; SCOPE 3.3; Each code uses 42K (octal) memory, card reader, line printer, and one tape.

20657 (ANL/NESC—500) FRCRL2; LOCA fission product release analysis. Ritzman, R.L. (Battelle Columbus Labs., OH (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048500.

The calculation is limited to maxima of 12 fission product species, 10 radial core regions, and 11 axial core regions. Also, four separate sets of fission product diffusion parameter values must be supplied for different temperature ranges or assumed atmospheric conditions.

The code calculates the cumulative fractional release of fission products from nuclear reactor fuel under postulated loss-of-coolant accident conditions. The mathematical model for release is based on simple volume diffusion theory and the equivalent-sphere approximation of fuel porosity. Both the operational preaccident release component and the accident core thermal transient-induced release component are calculated. Detailed core temperature data are needed to make the latter set of computations. In addition, specific core power distribution factors and fission product diffusion parameters must be supplied.CDC6400; FORTRAN IV; SCOPE 3.3; 62K (octal) memory, card reader, line printer.

20658 (ANL/NESC—508) MUCHA1;MUCHA2; multiple channel analysis emergency core cooling. Cudnik, R.A. (Battelle Columbus Labs., OH (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048508.

In MUCHA1 the two fuel rods can be represented by up to a total of 15 radial nodes. Each fuel rod and its associated flow channel may be represented by up to 12 axial segments. MUCHA2 applies the same restrictions to each pair of equivalent fuel rods.

MUCHA1 predicts the thermal and hydraulic behavior of any two reactor fuel rods and their associated parallel flow channels during a loss-of-coolant accident using as boundary conditions plenum fluid conditions determined by MUCHA2 or a system-oriented code. MUCHA2 predicts the thermal and hydraulic behavior of the primary coolant within the reactor pressure vessel during a loss-of-coolant accident. The heated core is represented by two equivalent fuel rods and their associated parallel flow channels. A plenum model has been developed to predict the upper and lower plenum fluid conditions throughout the accident sequence for use as boundary conditions for the parallel core channels.CDC6400; FORTRAN IV; SCOPE 3.3; MUCHA1 requires 120K (octal) memory and one tape for restart capability. MUCHA2 requires 120K (octal) memory, one tape for restart capability, and one tape for storing plenum boundary conditions.

20659 (ANL/NESC—511) VENUS2; 2-dimensional coupled neutronics-hydrodynamics. Jackson, J.F. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048511.

VENUS2 is an improved edition of the VENUS fast-reactor disassembly program. It is a two-dimensional (r-z) coupled neutronics-hydrodynamics code that calculates the dynamic behavior of an LMFBR during a prompt-critical disassembly excursion. It calculates the power history and fission energy release as well as the space-time histories of the fuel temperatures, core material pressures, and core material motions. Reactivity feedback effects due to Doppler broadening and reactor material motion are taken into account.IBM360,370,303x;CDC7600; FORTRAN IV(H); OS/360 (IBM360) and SCOPE 2.1 (CDC7600); 440K bytes are used for the IBM version when storing the data in double-precision. Single-precision storage is adequate for the converted CDC7600 version which requires 160,000 (octal) words of memory for execution. One peripheral storage device is needed if the graphical output option is used.

20660 (ANL/NESC—518) ERREST; loss of coolant rod bundle critical heat flux data analysis. Lintner, M.A. (EG and G Idaho, Inc., Idaho Falls (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048518.

ERREST sorts the rod bundle library of critical heat flux data and performs error calculations on sorted subsets.IBM360; FORTRAN IV; OS/360; 460K bytes.

20661 (ANL/NESC—521) SOCOOL2; sodium-fuel interaction analysis. Padilla, A. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048521.

The presence of an initial amount of sodium vapor or noncondensible gas cannot be taken into account. Time delays in the process of fragmentation and mixing of the molten material into the sodium cannot be considered. Heat transfer during the two-phase expansion of sodium is neglected.

SOCOOL2 calculates the transient temperatures, pressures, and mechanical work energy when a molten material is instantaneously and uniformly dispersed in liquid sodium which is initially under acoustic constraint.IBM360;UNIVAC1108; FORTRAN IV; CSCX (UNIVAC1108), OS/360 (IBM360); UNIVAC1108 - 19K words of memory, IBM360 - 115K bytes of memory.

20662 **(ANL/NESC—525) ORTHIS;ORTHAT; 2-dimensional heat conduction.** Durfee, R.C.; Nestor, C.W. (Oak Ridge National Lab., TN (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048525.

Maxima of - 1000 vertical nodes 1000 horizontal nodes 10000 total nodes (rows*columns) 50 vertical regions 50 horizontal regions 2500 total regions (rows*columns) 300 materials 1500 steady-state iterations 5000 transient time-steps.

ORTHIS and ORTHAT are designed to solve steady-state and transient heat conduction problems, respectively, in two-dimensional geometries. Either Cartesian (x-y) or cylindrical (r-z, r-theta) coordinate systems may be used. Thermal properties, heat generation rates, and boundary conditions may be functions of position, time, or temperature.IBM360; FORTRAN IV and BAL; OS/360; ORTHIS requires 700K, ORTHAT requires 1024K bytes.

20663 **(ANL/NESC—527) HERMES; regional radiological effects analysis.** Bentley, B.W.; Wise, K.R. (Hanford Engineering Development Lab., Richland, WA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048527.

The following are all approximate dimension restrictions - 12 time-periods (months) 50 radionuclides 200 radionuclide sources (nuclear sites) 300 receptor locations.

The HERMES model calculates the regional radionuclide releases and radiation dose to the populace in a given year arising from the operation of nuclear facilities to meet electrical generation demands within a given study region.UNIVAC1108; FORTRAN IV and SLEUTH; CSCX; 65K memory and a magnetic drum or alternative device for storage of large amounts of data.

20664 **(ANL/NESC—528) PREP;KITT; system fault tree evaluation codes.** Vesely, W.E.; Narum, R.E. (EG and G Idaho, Inc., Idaho Falls (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048528.

The PREP/KITT computer program package obtains system reliability information from a system fault tree. The PREP program finds the minimal cut sets and/or the minimal path sets of the system fault tree. (A minimal cut set is a smallest set of components such that if all the components are simultaneously failed the system is failed. A minimal path set is a smallest set of components such that if all of the components are simultaneously functioning the system is functioning.) The KITT programs determine reliability information for the components of each minimal cut or path set, for each minimal cut or path set, and for the system. Exact, time-dependent reliability information is determined for each component and for each minimal cut set or path set. For the system, reliability results are obtained by upper bound approximations or by a bracketing procedure in which various upper and lower bounds may be obtained as close to one another as desired. The KITT programs can handle independent components which are nonrepairable or which have a constant repair time. Any assortment of nonrepairable components and components having constant repair times can be considered. Any inhibit conditions having constant probabilities of occurrence can be handled. The failure intensity of each component is assumed to be constant with respect to time. The KITT2 program can also handle components which during different time intervals, called phases, may have different reliability properties.IBM360;UNIVAC1108; FORTRAN IV; OS/360 MVT (IBM360); 350K bytes on the IBM360.

20665 **(ANL/NESC—529) ANVENT; los of coolant analysis Duke Power McGuire units.** Kelly, J.L.; Krell, R.S. (Duke Power Co., Charlotte, NC (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048529.

The ANVENT program was developed to analyze thermal effects of a loss-of-coolant accident (LOCA) in a Westinghouse ice condenser nuclear unit, similar to the Duke Power Company's McGuire units. The program is capable of evaluating (1) steady-state radial temperature distributions corresponding to fixed inside and outside temperatures, (2) radial temperature distributions in the steel containment shell and the concrete reactor (shield) building during the post-LOCA transient, (3) temperature and pressure in the annulus between the containment shell and reactor building during the post-LOCA transient, and (4) capability of the annulus ventilation fan to quickly attain and maintain a vacuum in the annulus after a LOCA occurs.GE635 MARK2 Time-Sharing System; FORTRAN IV; GE635 MARK 2 Time-Sharing System.

20666 **(ANL/NESC—544) PLOT-3D; 3-dimensional plots on IBM2280 or CalComp780.** Basinger, D.; Gvildys, J. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048544.

Versions 3 and 4 limit number of rows in arrays (x,y,z) to 100 and also number of columns in arrays (x,y,z) to 100.

PLOT-3D is a package of subprograms designed to draw three-dimensional surfaces from arrays of points (x,y,z). The surfaces can be drawn after arbitrary rotations about the three coordinate axes.IBM360/75 with an IBM2280 film recorder or a CalComp 780 plotter; FORTRAN IV; OS/360 ASP; Versions 1 and 3, for the IBM 2280 film recorder, require 7810 and 58,285 bytes of core storage, exclusive of film recorder subroutines and arrays. Versions 2 and 4, for the CalComp plotter, require 6670 and 62,435 bytes of core storage, exclusive of CalComp plotter subroutines and arrays.

20667 **(ANL/NESC—852) HEXEREI2; HTGR thermal-hydraulic analysis.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Becker, B.R. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048852.

The major restrictions on the general application of the code are that only cylindrical geometry is allowed, and the coolant is assumed to be helium or a helium-air mixture. Problem size maxima include - 50 boundary conditions 100 fine lattice lines along any axis 50 gross lattice lines along any axis 20 heat generation functions 25 initial temperature functions 50 materials 100 regions 20 nodes in special temperature table 121 nodal columns 25 nodal planes when using coolant calculations 25 analytical functions 25 tabular functions 25 points per tabular function 100 printout times.

HEXEREI2 is a complex program capable of analyzing High Temperature Gas-Cooled Reactors (HTGRs) during accidents to provide most of the information needed for HTGR safety studies. HEXEREI2 is designed to solve steady-state and transient three-dimensional heat conduction, coupled with convection to axially flowing coolant in a large number of parallel channels. Both the coolant temperature and flow distribution among the channels are influenced by the heat transferred into the coolant. The thermal conductivity, density, and specific heat may be spatial- and temperature-dependent and may be modified further by HTGR design parameters. The conductivity can be anisotropic. Heat generation rates may be dependent on time, position, and HTGR design parameters. The boundary temperatures may be time-dependent. The boundary conditions may be fixed temperatures or any combination of prescribed heat flux, forced convection, and radiation from a surface to a boundary temperature. The boundary condition parameters may be time- and temperature-dependent. HEXEREI2 can model a coolant which may be helium, air, or a helium-air mixture. The nodal mesh is automatically generated from input parameters and produces a model capable of an accurate thermal-hydraulic analysis of an HTGR. The generated mesh emulates the HTGR in geometric structure allowing the code to analyze the largest HTGR design yet proposed.IBM360; FORTRAN IV (99%) and BAL (1%); OS/360; The maximum number of nodes can be easily adjusted to fit the problem and computer storage limitations. The storage requirement on an IBM360 machine ranges from 314K bytes for one node to 1500K bytes for 6000 nodes. The sample problems required 490K bytes on an IBM370/195.

20668 (ANL/NESC—871R) ICARUS; redundant system unavailability model. Vaurio, J.K. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048871.

The system configuration is limited to m/n with 1.LE.m.LE.n.LE.4. The three testing strategies allowed are random, uniformly staggered, and nearly simultaneous. In the random scheme, the components are tested at randomly shifted times throughout the test interval. The uniformly staggered scheme performs the component tests at equally-spaced times throughout the test interval. In the nearly simultaneous schemes, all components are tested consecutively at the beginning of the interval. The equations assume only one component per redundancy. However, redundancies with several components in series can be analyzed by properly defining the failure data for a series system in terms of the data for individual components. .

ICARUS calculates the unavailability characteristics of a periodically tested standby system with m-out-of-n redundancy (1.LE.m.LE.n.LE.4). The main functions of the program are to calculate the average unavailability, the optimum test interval, and fractional unavailabilities due to testing, repair, and random failures for three different testing strategies. The program will also calculate the average unavailability as a function of the test interval at each point in the range 0.2T(optimum) to 1.8T(optimum) at intervals of 0.2T(optimum). ICARUS can be used to evaluate sensitivities to different failure modes and data, as well as current testing or repair strategies, to determine if changes to these strategies will optimize the system availability.IBM370,303x; FORTRAN IV; OS/370; 60K bytes of memory are required for execution of the program.

20669 (ANL/NESC—889) RAS; reliability analysis for phased missions. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Burdick, G.R. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048889.

Maximum of - 5 distinct phases per mission.

The Reliability Analysis System, RAS, is an integrated package of computer programs for the quantification of fault trees. In particular, RAS has the capability of performing phased mission analysis. A phased mission is a task to be performed by a system during which the logic model and/or the component failure mode characteristics change at predetermined times. RAS is capable of finding minimal cut sets from fault trees and of calculating reliability characteristics for the basic events, the minimal cut sets, and the top event of a fault tree. In addition, mission cut set cancellation and four methods of bounding mission unreliability have been incorporated into RAS.CDC CYBER176;CDC7600,6600; FORTRAN IV (96%) and COMPASS (4%); SCOPE 2.1 (CDC7600), NOS/BE (CDC CYBER176, CDC6600); If the program is segmented, 42,000 (octal) words of small core memory (SCM) and 10 (octal) words of large core memory (LCM) are required for execution on a CDC7600. For the CDC6600, 135,000 (octal) words of central memory and 10 (octal) words of Extended Core Storage (ECS) are required. Without segmentation, additional memory will be required.

20670 (ANL/NESC—890) SAFE; fail-to-safe analysis of protective networks. Kontoleon, J.M. (Wollongong Univ. (Australia). Dept. of Electrical Engineering). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048890.

Maxima of - 100 buffer nodes 100 input nodes 50 logic nodes The program makes the following assumptions: a) All nodes are s-independent. b) Logic nodes are perfectly reliable. c) Input nodes, buffer nodes, and the protective network itself can be in either a good, fail-to-safe, or fail-to-danger state. d) A failed input or buffer node cannot become good or change mode of failure.

SAFE is designed to analyze the fail-to-safe (FS) and fail-to-danger (FD) probabilities of failure of large protective networks, such as those associated with nuclear reactor protective systems. Components of the protective network may include sensors, safety lines, and logic units which have either an m-out-of-n or a majority voting configuration. Sensors and safety lines may fail in either a FS or FD mode of failure. The overall logic protective network is modeled as a network with three types of nodes - input, buffer, and logic - and arcs. The nodes specify the components involved in the logic network and the arcs their interconnections. The nodes are numbered successively to provide a simple description of the logic protective network to the computer. The simulation of unreliable logic nodes is done by the use of reliable logic nodes and unreliable buffer nodes. The program can also be used in the evaluation of the probability of occurrence of the top event in a fault tree, provided the bottom events are s-independent and not mutually exclusive.UNIVAC1106,1100; FORTRAN IV, ASCII FORTRAN (FTN) compiler; EXEC8 Level 36; 44,000 words of memory are required for execution.

20671 (ANL/NESC—901) PAD; one-dimensional coupled Sn neutronics & hydrodynamics. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; McLaughlin, T.P. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048901.

Maxima of - 100 hydrodynamic regions 40 materials 16 neutron energy groups.

The PAjarito Dynamics (PAD) program models dynamic systems with interactive neutronics, thermodynamics, and hydrodynamics in one-dimensional spherical, cylindrical, and planar geometries. The program has been applied to prompt critical excursions in various fissioning systems (solution, metal, LMFBR, etc.) as well as to nonfissioning systems. PAD applications have included: controlled (nondestructive) and damaging reactor transient experiments, hypothetical LMFBR disassembly and recriticality accidents, hypothetical criticality accidents involving the handling and processing of various forms of fissile materials, and nonneutronic systems employing only the thermodynamic and hydrodynamic aspects of the program.CDC7600,6600,6400; FORTRAN IV (RUN compiler); SCOPE 2.1.5 (CDC7600); PAD requires system input and output units and a bulk storage device (e.g., disk or tape) on which four coded files may be defined. Each file should have a 32,000 (octal), 60-bit word capacity. PAD requires approximately 140K (octal) words of storage for execution on a CDC7600.

20672 (ANL/NESC—906R) DSTRESS; transient fuel model for clad strain. Fox, G.L. (Hanford Engineering Development Lab., Richland, WA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048906.

Maxima of - 99 temperature-time points 22 fuel mesh points 1 cladding mesh point 7 pairs of print intervals The fuel temperature history must be supplied as input data. Cracked fuel is assumed to have an infinite number of cracks in a particular direction so the stress normal to the crack is equal to the negative of the crack gas pressure. Cracks in the circumferential direction are not allowed.

DSTRESS calculates cladding strains produced by the fuel when a fuel pin is subjected to an overpower transient. The mechanistic fuel model calculates fuel stresses with high creep rates, melting, cracking, and the accommodation of thermal expansion by the crack volume.CDC6600,CYBER175; FORTRAN IV; SCOPE 3.4 (CDC6600), NOS 1.3 (CDC CYBER175); DSTRESS requires 43,000 (octal) words of memory for execution. The plotting program, PLOTR, requires 61,000 (octal) words of memory. DSTRESS creates a data file used as input to PLOTR on logical unit 8.

20673 (ANL/NESC—917) RELAP5/MOD1/018; LWR loss of coolant analysis. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; James, S.W. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048917.

The limitations on the number of hydrodynamic volumes, heat structures, trips, minor edits, etc. are primarily dictated by the available memory of the computer. Dynamic allocation of storage is used for all problem-dependent data. Design of the fields used for input data can also impose limits. Problems with over 150 hydrodynamic volumes and over 100 heat structures have been run on a CYBER176 using 270K of SCM and 200K of LCM storage for input processing and less during transient analysis.

RELAP5 was developed to describe the behavior of a light water reactor (LWR) subjected to postulated transients such as loss of coolant from large or small pipe breaks, pump failures, etc. RELAP5 calculates fluid conditions such as velocities, pressures, densities, qualities, temperatures; thermal conditions such as surface temperatures, temperature distributions, heat fluxes; pump conditions; trip conditions; reactor power and reactivity from point reactor kinetics; and control system variables. In addition to reactor applications, the program can be applied to transient analysis of other thermal-hydraulic systems with water as the fluid. RELAP5 uses a five equation two-phase flow hydrodynamic model consisting of the two phasic continuity equations, the two phasic momentum equations, and an overall energy equation augmented by the requirement that one of the phases is assumed saturated. In this model only two interphase constitutive relations are required, those for interphase drag and interphase mass exchange. Models are included for abrupt area changes, choking, mass transfer, interphase drag, wall friction, and branching.CDC CYBER176;CDC7600; FORTRAN IV (90%) and COMPASS (10%); NOS/BE (CDC CYBER176), SCOPE 2.1.5 (CDC7600); RELAP5 has run on a 64K CDC7600 and a 132K CYBER176 both with and without use of LCM storage. The RELAP5 package contains options (implemented through the CDC UPDATE utility program) intended to allow RELAP5 implementation on a CYBER76 operating under SCOPE2 and a CYBER170 or similar CYBER series hardware under NOS/BE.

20674 (ANL/NESC—927) SPIRT; stress-strains from transient pressures. Siefken, L.J. (EG and G Idaho, Inc., Idaho Falls (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048927.

The SPIRT (Stress-strains from Pressures Instigated by Reactor Transients) program was developed to predict the pressure generated by the rapid dispersal of molten UO2 from power-reactor-type fuel rods into the coolant water. This rapid dispersal of molten fuel results from very high-power excursions initiated by the rapid insertion of reactivity. SPIRT was used in the safety analyses of the ATR and ETR. The program can analyze the response of one-dimensional plane, cylindrical, and spherical geometric configurations to pressure-generating heat sources with free- or fixed-surface boundary conditions. SPIRT can calculate the response of systems to the dispersal of hot fuel particles as a function of the following variables: enthalpy of fuel at time of dispersal, rate at which fuel is dispersed, size of dispersed fuel droplets, dispersal density of fuel (grams of fuel dispersed per cc of water), quality of water at time of fuel dispersal, enthalpy of water at time of fuel dispersal, system pressure at time of fuel dispersal, and the size and constituency of the medium enveloping the dispersed fuel. By holding all but one of the listed variables constant, and varying that one, the program computes the relative effect of that variable upon the response of systems to the dispersal of hot fuel. SPIRT exists as two releases - one, written for UO2 fuel is called SPIRTU; the second, for uranium-aluminide fuel is identified as SPIRTA.CDC CYBER76,175; FORTRAN IV; SCOPE 2.1 (CDC CYBER76), NOS 1.3 (CDC CYBER175); SPIRTU and SPIRTA require approximately 173K (octal) words for execution under NOS 1.3.

20675 (ANL/NESC—943) RIO; power plant reliability characteristics. Poloski, J.P. (EG and G Idaho, Inc., Idaho Falls (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048943.

Maxima of - 150 accident sequences per release category (PHASE1) 25 events per accident sequence (PHASE1) 25 sets of data for describing the safety systems, initiators, and containment failure modes (PHASE1) 40 constraint equations (PHASE2),20 independent variables (PHASE2).

RIO, which consists of two FORTRAN programs, determines reliability importance and allocates optimal reliability goals for nuclear power plant safety systems. The first program, PHASE1, determines the importance of each safety system's contribution to overall plant risk and ranks the systems accordingly. The second program, PHASE2, is a nonlinear optimization code that determines optimal values of systems' reliability characteristics subject to the risk constraints imposed on the plant.CDC7600,CYBER175; FORTRAN IV (86%) and COMPASS (14%); SCOPE 2.1 (CDC7600), NOS 1.3 (CDC CYBER175); 30,000 (octal) words of memory are required by the PHASE1 program; PHASE2 requires 40,000 (octal) words.

20676 (CONF-800804—44) LMFBR operational and experimental in-core local-fault experience, primarily with oxide fuel elements. Warinner, D.K. (Argonne National Lab., IL (USA)). [nd]. Contract W-31-109-ENG-38. 37p. NTIS, PC A03/MF A01. Order Number DE83007817.

From ASME century 2 emerging technology conference; San Francisco, CA, USA (10 Aug 1980).

Case-by-case reviews of selective world experience with severe local faults, particularly fuel failure and fuel degradation, are reviewed for two sodium-cooled thermal reactors, several LMFBRs, and LMFBR-fuels experiments. The review summarizes fuel-failure frequency and illustrates the results of the most damaging LMFBR local-fault experiences of the last 20 years beginning with BR-5 and including DFR, BOR-60, BR2's MFBS-and Mol-loops experiments, Fermi, KNK, Rapsodie, EBR-II, and TREAT-D2. Local-fault accommodation is demonstrated and a need to more thoroughly investigate delayed-neutron and gaseous-fission-product signals is highlighted in view of uranate formation, observed blockages, and slow fuel-element failure-propagation.

20677 (CONF-811003—6) Time-resolved and time-integrated radiography of fast reactor fuel elements. De Volpi, A. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 18p. NTIS, PC A02/MF A01. Order Number DE83007755.

From ASNT fall conference; Atlanta, GA, USA (12 Oct 1981).

The fast-reactor safety program has some unusual requirements in radiography. Applications may be divided into two areas: time-resolved or time-integrated radiography. The fast-neutron hodoscope has supplied all recent time-resolved cineradiographic in-pile fuel-motion data, and various x-ray and photographic techniques have been used for out-of-pile experiments. Thick containers and the large number of radioactive fuel pins involved in safety research have been responsible for some nonconventional applications of time-integrated radiography of stationary objects. Hodoscopes record fuel-motion during transient experiments at the TREAT reactor in the United States and CABRI in France. Other special techniques have been under development for out-of-pile nondestructive radiography of fuel element subassemblies, including fast-neutron and gamma-ray tomographic methods.

20678 (CONF-820406—24) **Technical feasibility of transition phase tests in TREAT.** Stewart, R.R.; Bauer, T.H.; Hoff, O.I.; Koyama, K.; Stephenson, M.E.; Kraft, T.E. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 9p. NTIS, PC A02/MF A01. Order Number DE83007732.

From Topical meeting on fast, thermal and fusion reactor experiments; Salt Lake City, UT, USA (12 Apr 1982).

Understanding the behavior of molten fuel-steel mixtures subjected to fission heating within a HCDA environment is essential to continuing the mechanistic description of the whole-core accident into the transition phase, and further to a permanent subcritical and safe fuel debris configuration. Fundamentally, the RX1 TREAT test will simulte the transition phase of a HCDA (the accident phase in which the fuel in individual subassemblies melts and becomes a heat-generating pool of molten fuel and boiling steel). This assessment of the feasibility of such a test indicates that a transition phase test can be achieved in TREAT, at power levels simulating decay heat.

20679 (CONF-820566—8) **Design analysis of the upgraded TREAT reactor.** Bhattacharyya, S.K. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 24p. NTIS, PC A02/MF A01. Order Number DE83007680.

From Thermal reactor benchmark calculations, techniques, results and applications seminar; Upton, NY, USA (17 May 1982).

The TREAT reactor, fueled by a dilute dispersion of fully enriched UO_2 in graphite, has been a premier transient testing facility since 1959. A major Upgrade of the reactor is in progress to enhance its transient testing capability in support of the LMFBR safety program. The TREAT Upgrade (TU) reactor features a modified central zone of the core with higher fissile loadings of the same fuel, clad in Inconel to allow operation at higher temperatures. The demanding functional requirements on the reactor necessitated the use of unique features in the core design which, in turn, presented major calculational complexities in the analysis. Special design methods had to be used in many cases to treat these complexities. The addition of an improved Reactor Control System, a safety grade Plant Protection System and an enhanced Coolant/Filtration System produces a reactor that can meet the functional requirements on the reactor in a safe manner.

20680 (CONF-820601—24) **Hydrodynamics of annular-dispersed flow.** Ishii, M.; Kataoka, I. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 36p. NTIS, PC A03/MF A01. Order Number DE83007625.

From ASME pressure vessel and piping conference; Orlando, FL, USA (27 Jun 1982).

The interfacial drag, droplet entrainment, and droplet size distributions are important for detailed mechanistic modeling of annular dispersed two-phase flow. In view of this, recently developed correlations for these parameters are presented and discussed in this paper. The drag correlations for multiple fluid particle systems have been developed from a similarity hypothesis based on the mixture viscosity model. The results show that the drag coefficient depends on the particle Reynolds number and droplet concentration. The onset on droplet entrainment significantly alters the mechanisms of mass, momentum, and energy transfer between the film and gas core flow as well as the transfer between the two-phase mixture and the wall. By assuming the roll wave entrainment mechanism, the correlations for the amount of entrained droplet as well as for the droplet size distribution have been obtained from a simple model in collaboration with a large number of data.

20681 (CONF-820802—53) **Volatile fission-product source term evaluation using the fastgrass comptuer code.** Rest, J. (Argonne National Lab., IL (USA)). Aug 1982. Contract W-31-109-ENG-38. 16p. NTIS, PC A02/MF A01. Order Number DE83007714.

From International meeting on thermal nuclear reactor safety; Chicago, IL, USA (29 Aug 1982).

As the noble gases play a major role in establishing the interconnection of escape routes from the interior to the exterior of nuclear reactor fuel, a realistic description of the release of volatile fission products (VFPs) must a priori include a realistic description of fission-gas release and swelling. The steady-state and transient gas release and swelling subroutine, FASTGRASS, has been modified to include a mechanistic description of behavior of VFPs (I, Cs, CsI, Cs_2MoO_4, and Cs_2UO_4). Phenomena modeled are the chemical reactions between the VFPs, VFP migration through the fuel, and VFP interaction with the noble gases. This paper will describe calculations performed with FASTGRASS to describe the release of noble gases, I, Cs, and CsI from LWR fuel during steady-state and power-ramping conditions. Key issues that are addressed in the analysis are the effects of (a) VFP chemistry, (b) various assumptions concerning mechanisms of VFP migration through solid UO_2, (c) fission-gas behavior, and (d) accident scenario on the chemical form of iodine and the rate of iodine release from water-reactor fuel.

20682 (CONF-820810—15) **Calculational limitations in PWR system simulation.** Abramson, P.B.; Kennedy, M.F.; Speis, T.P. (Argonne National Lab., IL (USA); Nuclear Regulatory Commission, Washington, DC (USA)). 1982. Contract W-31-109-ENG-38. 4p. NTIS, PC A02/MF A01. Order Number DE83007633.

From 10. international mathematics and computers simulation congress on systems simulation and scientific computation; Montreal, Canada (9 Aug 1982).

Engineering transient analysis codes, which are in general more accurate than the present generation of simulator software, can be expected to yield reasonably accurate results (+-20% or so on system pressure) if carefully utilized and if the two-phase and transient flow conditions are not severe. As the severity of the transient increases, the confidence that one may have in the results decreases. None of the existing engineering analysis codes is well assessed or verified for transient analysis, but all give qualitatively the same results lending credence to their results. Recent comparisons to transients in LOFT and SEMISCALE are encouraging as are various comparisons to actual plant data.

20683 (CONF-820901—7) **Liquid transfer and entrainment correlation for droplet-annular flow.** Ishii, M.; Mishima, K. (Argonne National Lab., IL (USA); Kyoto Univ., Kumatori, Osaka (Japan). Research Reactor Inst.). 1982. Contract W-31-109-ENG-38. 7p. NTIS, PC A02/MF A01. Order Number DE83007703.

From 7. international heat transfer conference; Munich, F.R. Germany (6 Sep 1982).

A correlation for the amount of entrained liquid in annular flow has been developed from a simple model and experimental data. There are basically two different regions of entrainment, namely, the entrance and quasi-equilibrium regions. The correlation for the equilibrium region is expressed in terms of the dimensionless gas flux, diameter, cand total liquid Reynolds number. The entrance effect is taken into account by an exponential relaxation function. It has been shown that this new model can satisfactorily correlate wide ranges of experimental data for water. Furthermore, the necessary distance for the development of entrainment is identified. These correlations, therefore, can supply accurate information on entrainment which has not been available previously.

20684 (CONF-820901—8) **Experimental study on natural-convection boiling burnout in an annulus.** Mishima, K.; Ishii, M. (Kyoto Univ., Kumatori, Osaka (Japan). Research Reactor Inst.; Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 7p. NTIS, PC A02/MF A01. Order Number DE83007705.

From 7. international heat transfer conference; Munich, F.R. Germany (6 Sep 1982).

An experimental study was performed on burnout heat flux at low flow rates for low-pressure steam-water upward flow in an annulus. The data indicated that a premature burnout occurred due to flow-regime transition from churn-turbulent to annular flow. It is shown that the burnout observed in the experiment is essentially a flooding-limited burnout and the burnout heat flux can be well reproduced by a nondimensional correlation derived from the previously obtained criterion for flow-regime transition. It is also shown that the conventional correlations for burnout heat flux at low mass velocities agree well with the data on circulation and entrainment-limited burnout.

20685 (CONF-820985—3) Vapor pressures and vapor compositions in equilibrium with hypostoichiometric uranium-plutonium dioxide at high temperatures. Green, D.W.; Fink, J.K.; Leibowitz, L. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 24p. NTIS, PC A02/MF A01. Order Number DE83007722.

From 8. European conference on thermophysical properties - high temperatures high pressure; Baden-Baden, F.R. Germany (27 Sep 1982).

Vapor pressures and vapor compositions in equilibrium with a hypostoichiometric uranium-plutonium dioxide condensed phase (U/sub 1-y/Pu/sub y/)O/sub 2-x/, as functions of T, x, and y, have been calculated for $0.0 \leqq x \leqq 0.1$, $0.0 \leqq y \leqq 0.3$, and for the temperature range $2500 \leqq T \leqq 6000$ K. The range of compositions and temperatures was limited to the region of interest to reactor safety analysis. Thermodynamic functions for the condensed phase and for each of the gaseous species were combined with an oxygen potential model to obtain partial pressures of O, O_2, Pu, PuO, PuO_2, U, UO, UO_2, and UO_3 as functions of T, x, and y.

20686 (CONF-8106164—4) Thermophysical properties of reactor fuels. Leibowitz, L. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 29p. NTIS, PC A03/MF A01. Order Number DE83007935.

From National Bureau of Standards joint conferences: 8. symposium on thermophysical properties; 17. thermal conductivity conference; 8. thermal expansion conference; Gaithersburg, MD, USA (15 Jun 1981).

A review is presented of the literature on the enthalpy of uranium, thorium, and plutonium oxide and an approach is described for calculating the vapor pressure and gaseous composition of reactor fuel. In these calculations, thermodynamic functions of gas phase molecular species (obtained from matrix-isolation spectroscopy) are employed in conjunction with condensed phase therodynamics. A summary is presented of the status of this work.

20687 (CONF-8109206—1) Transition from forced to natural convective flow in an LMFBR under adverse thermal conditions. Singer, R.M.; Mohr, D.; Gillette, J.L. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 8p. NTIS, PC A02/MF A01. Order Number DE83007706.

From 7. international heat transfer conference; Munich, F.R. Germany (6 Sep 1981).

One of the most important aspects of the demonstration of the safety of liquid metal cooled fast reactors (LMFBR) is the assurance of adequate cooling of the reactor and critical structures during all potential or hypothetical events. To this end, a design philosophy has developed in which alternate heat removal systems are included in a plant in order to provide independent, diverse, and redundant cooling from the normal heat transport system. Recent studies have examined various aspects of natural convective flow in such systems and preliminary conclusions from these efforts have indicated that the basic phenomena are reasonably well understood and predictable in most cases. However, in certain situations where significant thermal stratification occurs, the resulting buoyancy-driven flow patterns can become quite complex and as a result, the confidence in computer simulations diminishes. The purpose of this paper is to present the results of an experimental and analytical study of one class of such problems in which the development of natural convective flow requires a transition through an unstably stratified condition. The experiments were conducted in the Experimental Breeder Reactor II (EBR-II) and the analytical tool used was the NATDEMO system simulation code.

20688 (DOE/SF/02034—T82) Application of the lines-of-protection concept to the HTGR-SC/C. (Gas-Cooled Reactor Associates, La Jolla, CA (USA)). Sep 1981. Contract AC03-78SF02034. 90p. NTIS, PC A05/MF A01. Order Number DE83008099.

The purpose of this document is to present a method for structuring the safety related design and development plans for the HTGR. This method centers on and develops the concept that the HTGR inherently (and by design) provides independent and successive LOPs against potential core related accidents and any resulting public harm. To exemplify the LOP concept and its application to the HTGR, this document identifies some key bases and assumptions, describes the four LOPs selected for the HTGR, identifies the associated safety goals and plant success criteria, and establishes methods for safety research and development prioritization. A task breakdown structure is then described, which in a complete hierarchial fashion can be used to catalog all safety related tasks necessary to demonstrate LOP success as well as catalog safety research areas which cannot be conveniently grouped under the LOPs.

20689 (EPRI-NP—1850-CCM-Vol.4) RETRAN-02: a program for transient thermal-hydraulic analysis of complex fluid-flow systems. Volume 4. Applications. Peterson, C.E.; Gose, G.C.; McFadden, J.H. (Energy, Inc., Idaho Falls, ID (USA)). Jan 1983. 400p. NTIS, PC A17/MF A01. Order Number DE83901473.

RETRAN-02 represents a significant achievement in the development of a versatile and reliable computer program for use in best estimate transient thermal-hydraulic analysis of light water reactor systems. The RETRAN-02 computer program is an extension of the RETRAN-01 program designed to provide analysis capabilities for 1) BWR and PWR transients, 2) small break loss of coolant accidents, 3) balance of plant modeling, and 4) anticipated transients without scram, while maintaining the analysis capabilities of the predecessor code. The RETRAN-02 computer code is constructed in a semimodular and dynamic dimensioned form where additions to the code can be easily carried out as new and improved models are developed. This report (the fourth of a five volume computer code manual) describes the verification and validation of RETRAN-02.

20690 (EPRI-NP—2279) Westinghouse FREY calculations: excessive load increase, boron dilution, and rod withdrawal at power. Final report. Bein, J.D.; Ciccone, L.; Leech, W.J. (Westinghouse Electric Corp., Monroeville, PA (USA)). Feb 1982. 82p. NTIS (US Sales Only). Order Number DE82903310.

The purpose of this investigation was to execute three sample problems with the FREY Code (a transient analysis code for fuel rods), to document the problems, and to discuss the results. Three ANSI Condition II overpower transients were evaluated. Problem inputs were generated from reactor system models and fuel rod parameters. FREY results were compared to results from a Westinghouse fuel rod modeling code. FREY results for fuel temperatures in general display the correct trend with time during the transients. FREY temperature results are lower than the values obtained from the Westinghouse code. These differences were found to have been principally due to differences in the calculated gap conductance values.

20691 (EPRI-NP—2742) Scale-model turbine-missile-casing impact tests. Final report. Romander, C.M.; Florence, A.L. (SRI International, Menlo Park, CA (USA)). Jan 1983. 103p. NTIS, PC A06/MF A01. Order Number DE83901487.

Three 1/5-scale model turbine missile impact experiments are described in this report. These experiments were performed by SRI in support of the EPRI program to provide bench mark data for assessing turbine missile effects in nuclear plant design. The objective of the SRI experiments was to demonstrate the applicability of scaling in turbine missile impact of steel casing structures by comparing the results of the 1/5-scale tests with comparable full-scale tests performed by Sandia Laboratories. In the scale model experiments, geometric scaling was used where dimensions are reduced by the scale factor while materials, stresses, strains, and velocities remain the same as in the prototype. An explosive launcher was developed to accelerate the 1/5-scale models of a turbine missile to the desired impact velocities. The results of the scale model experiments agreed well with the results of the full-scale experiments and were sufficient to demonstrate scalability.

20692 (EUR—7053-EN) A theoretical study on the growth of large sodium vapour bubbles in liquid sodium. (Commission of the European Communities, Luxembourg). [nd]. 83p. NTIS, PC AE04/MF E04.

The growth of a large sodium vapour HCDA bubble in a finite pool of cold sodium is studied. During the growth the bubble is fed with hot vapor coming from the core. Temperature differences at the phase interface are then taken into account and the effect of non-condensable fission gases is parametrically investigated. Results are presented in graphical form for the case of a typical 300 MW fast breeder reactor. An increase in the quantity of non-condensable fission gases is shown to cause a slight increase in the growth velocity, a much greater increase of the vapor temperature and a decrease of the temperature of the liquid sodium at the bubble surface.

20693 (GKSS—82/E/23) **Vibration phenomena in large scale pressure suppression tests.** Aust, E.; Boettcher, G.; Kolb, M.; Sattler, P.; Vollbrandt, J. (GKSS-Forschungszentrum Geesthacht G.m.b.H., Geesthacht-Tesperhude (Germany, F.R.)). 1982. 19p. (CONF-8205131—2). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750183.

From 3. international conference on vibrations in nuclear plants; Keswick, UK (11 May 1982).

Structure und fluid vibration phenomena (acceleration, strain; pressure, level) were observed during blow-down experiments simulating a LOCA in the GKSS full scale multivent pressure suppression test facility. The paper describes first the source related excitations during the two regimes of condensation oscillation and of chugging, and deals then with the response vibrations of the facility's wetwell. Modal analyses of the wetwell were run using excitation by hammer and by shaker in order to separate phenomena that are particular to the GKSS facility from more general ones, i.e. phenomena specific to the fluid related parameters of blowdown and to the geometry of the vent pipes only. The lowest periodicities at about 12 and 16 Hz stem from the vent acoustics. A frequency of about 36 to 38 Hz prominent during chugging seems to result from the lowest local models of two of the wetwell's walls when coupled by the wetwell pool. Further peaks found during blowdown in the spectra of signals at higher frequencies correspond to global vibration modes of the wetwell.

20694 (Juel-Conf—43, pp 43-52) **Graphite corrosion in the HTR-type pebble bed reactor during accidents with air leakage and effects of air leakage combined with water ingress.** Katscher, W.; Moormann, R. Nov 1981. (In German). NTIS (US Sales Only), PC A07/MF A01.

From Seminar of the KTG on chemistry and nuclear waste disposal; Juelich, F.R. Germany (5 Nov 1981).

In addition to the calculations concerning accidents occurring in the HTR-type reactor relieved from pressure it is possible to study also accidents occurring under pressure by means of the calculation model REACT/THERMIX. Calculations which refer to the accident caused by water ingress have already been made for the PNP-300. The HTR-type reactor behaves well under massive air and/or water ingress when during after-heat removal.

20695 (KFK—3275, pp 39-43) **Precaution against damage required in the light of existing scientific and technical knowledge.** Smidt, D. Nov 1981. (In German). Dep. NTIS (US Sales Only).

Course of lectures of Karlsruhe Nuclear Research Centre and the University of Administrative Science, Speyer on May 18, 1981, June 1, 1981, June 22, 1981.

In Technical risks and law.

The author shows that in the past few years a growing complement to deterministic approach has developed due to probabilistic analysis. By means of this, a concept rendered perfect on singular points can be replaced by a well-balanced safety concept. That is why the major advantage brought about by these methods does not lie in the determination of absolute risk qualities, but in the improved transparency of the safety concept and in the spotting of weak points. Anyone determining existing knowledge in science and technology will have to use this tool. However, it has to be backed up by solid technical expertise and experience. Moreover, existing knowledge in science and technology is based on experts' consensus on experimental verification, tests, and on well-balancedness. Based on this approach, considerable improvements have been achieved in the material field during the past few years, which - in my opinion - have made the nuclear risk an acceptable one.

20696 (KFK—3275, pp 45-52) **Legal opinion in risk assessment of nuclear power plants.** Ossenbuehl, F. Nov 1981. (In German). Dep. NTIS (US Sales Only).

Course of lectures of Karlsruhe Nuclear Research Centre and the University of Administrative Science, Speyer on May 18, 1981, June 1, 1981, June 22, 1981.

In Technical risks and law.

The author describes the conceptual panoply and the starting position in law. Then he defines and determines residual risk. Using protection against bursting as an example, he demonstrates the problem of decision-making, discussing the decisions of Freiburg Administrative Court in the matter of the Whyl reactor, and the decision of Wuerzburg Administrative Court in the matter of the Grafenrheinfeld reactor. By 'establishing rules high above' the problem of decision-making can only be solved in parts. It is hardly possible to circumscribe exactly the control density of judicial reviewing in law. This density largely falls to the jurisdiction of the courts responsible, according to the density of the regulation. It appears questionable whether the time has come is ripe for transfering the 'establishment of rules on the outside', i.e. by informal technical bodies and committees, into the 'establishment of rules high above'. As long as we find ourselves in a relatively rapidly developing technological environment and at an experimental stage, even statutory orders may well be too rigid to be normative instruments.

20697 (LA—9619-MS) **Mechanistic debris-bed packing model.** Moore, J.A. (Los Alamos National Lab., NM (USA)). Feb 1983. Contract W-7405-ENG-36. 21p. NTIS, PC A02/MF A01. Order Number DE83008271.

The nonrandom packing of fuel rod debris around and above the surviving fuel rod segments is analyzed for a degraded core with the spacer grids modeled as a porous floor. The irregular shape of the debris is simulated by assuming that all of the spherical particles terminate their migration within the debris bed at their first two-point contact. Comparing computational results with experimental data for nonrandom packing verified the analytical approach. Specific calculations for the TMI-2 geometry reveal an average (horizontally integrated) nonrandom packing density between the fuel rods of ~ 0.30. If simulated vibrations are imposed, this value increases to 0.50. If the debris bed builds up above the fuel rod stubs, the average (horizontally integrated) packing density above these rods is ~ 0.38 without vibrations; loosely packed gravel has an average packing density of 0.45.

20698 (NP—3900667) **Effect of pulsation pipelines in nuclear installations on the environment.** Case, P.; Dagbjartsson, S.; Heger, L.; Ionescu, A.; Mieze, G. (Fichtner Beratende Ingenieure G.m.b.H. and Co. KG, Stuttgart (Germany, F.R.)). Jul 1981. 308p. (In German). Dep. NTIS (US Sales Only), MF A01. Order Number DE83900667.

A model study is made of the effect that burst pipes have on the pulsation of conduits through the use of computerized programs. The model study results are compared to installations with corresponding technology. Computer capabilities are presented as well as results of dynamic elastic linear computations and derived formulations.

20699 (NUREG—0090-V4-N4) **Report to Congress on abnormal occurrences, October-December 1981. Quarterly report.** (Nuclear Regulatory Commission, Washington, DC (USA)). May 1982. 36p. NTIS, PC A03/MF A01.

During the report period, there were two abnormal occurrences at the nuclear power plants licensed to operate. One involved a generic concern pertaining to blockage of coolant flow to safety-related systems. The other involved seismic design errors at Diablo Canyon Nuclear Power Plant with subsequent suspension of the fuel load and low power operating license for Unit 1. There were no abnormal occurrences for the other NRC licensees during the report period; the Agreement States reported no abnormal occurrences to the NRC. The report also contains information updating a previously reported abnormal occurrence.

20700 (NUREG—0485-V4-N4) **Systematic evaluation program status summary report, April 1982.** (Nuclear Regulatory Commission, Washington, DC (USA)). May 1982. 98p. NTIS, PC A05/MF A01.

The Systematic Evaluation Program examines many safety-related aspects of eleven of the older light water reactors. This document provides the existing status of the review process including individual topic and overall completion status.

20701 (NUREG—0606-Vol.5-No.1) **Unresolved safety-issues summary. Aqua book.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Resource Management). 18 Feb 1983. 92p. NTIS, PC A05/MF A01 - GPO. Order Number DE83901547.

The unresolved safety issues summary is designed to provide the management of the Nuclear Regulatory Commission with a quarterly overview of the progress and plans for completion of generic tasks addressing unresolved safety issues reported to Congress pursuant to Section 210 of the Energy Reorganization Act of 1974 as amended. This summary utilizes data collected from the Office of Nuclear Reactor Regulation, Office of Nuclear Regulatory Research, and the National Laboratories and is prepared by the Office of Resource Management. The schedules in this book include a milestone at the end of each action plan which represents the initiation of the implementation process both with respect to incorporation of the technical resolution of the NRC official guidance or requirements and also the application of changes to individual operating plants.

20702 (NUREG—0825) **Integrated Plant Safety Assessment, Systematic Evaluation Program. Yankee Nuclear Power Station, Yankee Atomic Electric Company, Docket No. 50-29. Draft report.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Reactor Regulation). Feb 1983. 549p. NTIS, PC A23/MF A01 - GPO $12.00. Order Number DE83901543.

The Systematic Evaluation Program was initiated in February 1977 by the US Nuclear Regulatory Commission to review the designs of older operating nuclear reactor plants to confirm and document their safety. The review provides (1) an assessment of how these plants compare with current licensing safety requirements relating to selected issues, (2) a basis for deciding on how these differences should be resolved in an integrated plant review, and (3) a documented evaluation of plant safety. This report documents the review of Yankee Nuclear Power Station, operated by Yankee Atomic Electric Company. The Yankee plant is one of 10 plants reviewed under Phase II of this program. This report indicates how 137 topics selected for review under Phase I of the program were addressed. Equipment and procedural changes have been identified as a result of the review.

20703 (NUREG—0845) **Agency procedures for the NRC incident response plan. Final report.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Inspection and Enforcement). Feb 1983. 294p. NTIS- GPO $8.50. Order Number DE83901540.

The NRC Incident Response Plan, NUREG-0728/MC 0502 describes the functions of the NRC during an incident and the kinds of actions that comprise an NRC response. The NRC response plan will be activated in accordance with threshold criteria described in the plan for incidents occurring at nuclear reactors and fuel facilities involving materials licensees; during transportation of licensed material, and for threats against facilities or licensed material. In contrast to the general overview provided by the Plan, the purpose of these agency procedures is to delineate the manner in which each planned response function is performed; the criteria for making those response decisions which can be preplanned; and the information and other resources needed during a response. An inexperienced but qualified person should be able to perform functions assigned by the Plan and make necessary decisions, given the specified information, by becoming familiar with these procedures. This rule of thumb has been used to determine the amount of detail in which the agency procedures are described. These procedures form a foundation for the training of response personnel both in their normal working environment and during planned emergency exercises. These procedures also form a ready reference or reminder checklist for technical team members and managers during a response.

20704 (NUREG—0891) **Nuclear property insurance: status and outlook.** (Nuclear Regulatory Commission, Washington, DC (USA)). May 1982. 134p. NTIS, PC A07/MF A01.

The report addresses the problem of the unavailability of adequate levels of property insurance for commercial power reactors to pay for decontamination and cleanup costs arising from accidents. The report is designed to answer six questions, as follows: (1) What has been the development of each principal source of nuclear property insurance used as of early 1982 by nuclear utilities in the United States; (2) What are some of the distinguishing features of nuclear property insurance as offered by the principal sources; (3) How much nuclear property insurance was offered by each of these sources as of January 1, 1982; (4) Assuming that present plans came to fruition, how much nuclear property insurance is likely to be offered by each of these sources as of January 1, 1983; (5) What, if any, principal sources of nuclear property insurance are likely to emerge in the private sector by January 1, 1983; (6) What problems serious enough to warrant action of the NRC exist with respect to nuclear property insurance and what action should NRC take in response to each problem.

20705 (NUREG—0963) **Review and evaluation of the Nuclear Regulatory Commission Safety Research Program for Fiscal Years 1984 and 1985.** (Nuclear Regulatory Commission, Washington, DC (USA). Advisory Committee on Reactor Safeguards). Feb 1983. 82p. NTIS, PC A05/MF A01 - GPO $5.50. Order Number DE83901519.

Report to the Congress.

This is the sixth report by the Advisory Committee on Reactor Safeguards (ACRS) that has been prepared in response to the Congressional requirement for an annual report on the Nuclear Regulatory Commission (NRC) Reactor Safety Research Program. Part I is a compilation of our general comments and recommendations regarding the NRC Safety Research Program, and includes budget recommendations and an identification of matters of special importance that deserve increased emphasis. It is intended to serve as an Executive Summary. Part II is divided into ten chapters, each of which represents a Decision Unit of the NRC research program. In each chapter, specific comments are included on the research involved in the Decision Unit, an assessment of priorities, and recommendations regarding new directions and levels of funding.

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20706 (NUREG/CP—0034-Vol.1, pp 108-117) **Neutronic analysis of simulated LMFBR fuel slump experiments.** Henneges, G.; Maschek, W. (Institut fuer Neutronenphysik und Reaktortechnik, Karlsruhe, Germany). Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

Based on LMFBR accident studies at KfK a number of safety-relevant core configurations were defined for the SNEAK 12A critical assembly. They simulate compacted and diluted regions resulting from expulsion of materials from portions of the core. Transport calculational methods were necessary to give a satisfactory interpretation. In the course of these evaluations two different 2-dimensional transport options available at KfK were tested and compared with experimental results. Direct eigen-value results with the S_4P_0 approximation in RZ-geometry predict the reactivity changes fairly well while first order perturbation transport theory leads to deviations which increase with the amount of fuel compacted but stay well below 20 cents if only moderate quantities of fuel are involved.

20707 (NUREG/CP—0034-Vol.1, pp 440-452) **Loss-of-fluid test (LOFT).** Engleman, D.B.; Hanson, D.J.; Knauts, H.E.; Russell, M.L. (EG & G Idaho, Inc., Idaho Falls). Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00. Contract AC07-76ID01570.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

The LOFT Project performs experiments to investigate the thermal-hydraulic and fuel response of a reactor system during simulated off-normal occurrences, including large- and small-break loss-of-coolant accidents (LOCAs), operational transients, and anticipated transients without scram (ATWS). The complex phenomena that are of interest in this diverse experimental program are characterized using a large set of state-of-the-art measurement systems. Included in this set are a group of measurements which are specifically designed to characterize the hydraulic and thermal behavior of the nuclear core. These unique core measurements have evolved through many years of research and development at the Idaho National Engineering Laboratory (INEL). This successful evolution was made possible through use of uncommon materials and original processes for the construction and attachment of the devices. In general, the in-core measurements have provided excellent results while showing good resistance to the harsh environment.

20708 (NUREG/CP—0034-Vol.1, pp 453-467) **Monitoring PWR reactor vessel liquid level with SPNDs during LOCAs.** Adams, J.P. (EG & G Idaho, Inc., Idaho Falls). Aug 1982. NTIS, PC A23/MF A01 - GPO $12.00. Contract AC07-76ID01570.

From NRC meeting on advances in reactor physics and core thermal hydraulics; Kiamesha Lake, NY, USA (22 Sep 1982).

Data from in-core self-powered neutron detectors taken during two nuclear loss-of-coolant accident simulations have been correlated with core moderator density changes. The detector current attenuation has been calculated during blowdown and reflood phases of the simulation. Based on these data, it is concluded that these detectors could be used to monitor reactor vessel liquid level during loss-of-coolant accidents in pressurized water reactors.

20709 (NUREG/CP—0039) **Proceedings of the Health Physics Society 1981 summer school on selected topics in Reactor Health Physics.** Christensen, R.C.; Sayeg, J.A.; Simmons, G.H.; Hahn, O.J. (eds.). (Health Physics Society, East Weymouth, MA (USA)). Dec 1982. 701p. (CONF-8106181—). NTIS, PC A99/MF A01. Order Number DE83900961.

From Health physics summer school on selected topics in reactor health physics; Lexington, KY, USA (14 Jun 1981).

Separate abstracts were prepared for the 21 papers in the proceedings of the Health Physics Society 1981 Summer School on Reactor Health Physics. (KRM)

20710 (NUREG/CP—0039, pp M.1-M.30) **Selected monitoring practices.** Rich, B.L. (EG & G Idaho, Inc., Idaho Falls). Dec 1982. NTIS, PC A99/MF A01. Contract AC07-76ID01570.

From Health physics summer school on selected topics in reactor health physics; Lexington, KY, USA (14 Jun 1981).

This paper covers, in general terms, a discussion of considerations in monitoring and controlling radiation hazards in a nuclear plant. The following areas are discussed: types of fields encountered from fission and activation products, neutron fields, and others, with implications; related considerations such as calibration sources, emergency conditions, ALARA; portable survey instrument considerations as they apply to monitoring; personnel dosimetry, limitations and considerations; field control principles; and effluent evaluation considerations.

20711 (NUREG/CP—0039, pp U.1-U.30) **Impact of the 1980 BEIR-III report on low-level radiation risk assessment, radiation protection guides, and public health policy.** Fabrikant, J.I. (Univ. of California, Berkeley). Dec 1982. NTIS, PC A99/MF A01. Contract W-7405-ENG-48.

From Health physics summer school on selected topics in reactor health physics; Lexington, KY, USA (14 Jun 1981).

This paper presents a general background to our understanding of the potential health effects of low-level radiation. It uses as the basis for discussion the deliberations of the 1980 BEIR Report. Discussion includes: (1) what we know about the important biological and health effects of low-level radiation; (2) what we do not know about these health effects of low-level radiation; (3) what the uncertainties are in the dose-response relationships for radiation-induced cancer; (4) what the controversy is over low-level radiation; and (5) what the uncertainties are in estimation of the carcinogenic risk in man of low-level radiation. Review includes: (1) the sources of epidemiological data for estimation of excess cancer risk in exposed human populations; and (2) the current risk estimates of radiation-induced cancer in man. Discussion also includes what is known about the teratogenic and genetic effects in man of low-level radiation. Conclusions address what the implications are of numerical risk estimation and decision-making for radiological protection and public policy.

20712 (NUREG/CR—1582-Vol.1) **Seismic hazard analysis overview and executive summary.** Bernreuter, D.L.; Minichino, C. (Lawrence Livermore National Lab., CA (USA)). Oct 1982. Contract W-7405-ENG-48. 35p. (UCRL—53030-Vol.1). NTIS, PC A03/MF A01 - GPO. Order Number DE83008594.

The Site Specific Spectra Project (SSSP) described in this report was a multi-year study funded by the US Nuclear Regulatory Commission (NRC) as part of NRC's Systematic Evaluation Program (SEP). The main objective of this project was to provide assistance to the NRC by developing estimates of the seismic hazard at the nine oldest nuclear power plant sites east of the Rocky Mountains which were included in the SEP. This volume gives brief overview of the SEP and the SSSP including a discussion of the formal elicitation of expert opinion used to obtain a subjective representation of parameters that affect seismic hazard and the development of the seismic hazard at the nine SEP facilities.

20713 (NUREG/CR—2334) **Interphase transport in horizontal stratified cocurrent flow.** Jensen, R.J.; Yuen, M.C. (Northwestern Univ., Evanston, IL (USA)). May 1982. 201p. NTIS, PC A10/MF A01.

The problem of interfacial transport in cocurrent, horizontal stratified gas-liquid systems is considered. Local condensation heat transfer coefficients and interface shear stress were obtained from mass and force balances. Based on cocurrent stratified air-water flow data, the noncondensing interface shear stress was found to be a function of the relative velocity between the phases and the liquid fraction. Incorporated into Linehan's relation for condensing flow shear stress, the correlation was found to estimate the shear velocity for the condensation data considered. Local condensation heat transfer coefficients and gas absorption mass transfer coefficients were found to be directly proportional to the shear velocity.

20714 (NUREG/CR—2401) **PWR FLECHT SEASET systems effects: natural circulation and reflux condensation. Task plant report: NRC/EPRI/Westinghouse Report No. 12.** Rosal, E.R.; Hochreiter, L.E.; Andreychek, T.S. (Electric Power Research Inst., Palo Alto, CA (USA); Westinghouse Electric Corp., Pittsburgh, PA (USA)). Feb 1983. 414p. (EPRI-NP—2015; WCAP—9973). NTIS, PC A18/MF A01 - GPO. Order Number DE83901508.

This report presents a descriptive plan of tests for the Systems Effects Task of the Full-Length Emergency Cooling Heat Transfer Systems Effects tests (FLECHT SEASET). This task is designed to produce experimental data which can be used to address issues related to natural circulation cooling modes in a pressurized water reactor (PWR). The natural circulation tests were planned in direct response to the accident at Three Mile Island. The tests consist of natural circulation and reflux condensation cooling experiments using electrical heating rods to simulate curent nuclear core arrays of PWR and PWR fuel vendors. The FLECHT SEASET systems effects tests facility with a scale factor of 1/307 with respect to a four-loop 3411 MWt PWR was used. The facility was designed with all elevations identical to those of a PWR. Two full-height steam generators with active secondary side heat removal are also part of the system design. All tests were conducted with a cosine axial power profile. The data obtained from these tests will be used to evaluate the effets of components and systems parameters during natural circulation cooling modes.

20715 (NUREG/CR—2618) **Experiment data report for Semiscale Mod-2A Natural-Circulation Test S-NC-7C.** Larson, R.A. (EG and G Idaho, Inc., Idaho Falls (USA)). Mar 1982. Contract AC07-76ID01570. 45p. (EGG—2179). NTIS PCE06/MF A01 - GPO. Order Number DE83007981.

This report presents test data recorded for Test S-NC-7C of the Semiscale Mod-2A Natural Circulation Test Series. This is one of several Semiscale tests that investigate the thermal-hydraulic phenomena resulting from operational transients or small-break loss-of-coolant accidents (LOCAs) involving loss of mechanical primary coolant circulation in a pressurized water reactor. These tests produce experimental data to develop and assess the analytical capability of computer models used to predict the results of such small-break LOCAs and operational transients. The primary objectives of Test S-NC-7C were to experimentally characterize the relationship of natural circulation flow to primary system inventory, and to examine the influence on system behavior of imbalancing the secondary side of one loop.

20716 (NUREG/CR—2659) Iodine transport predicted for a postulated steam-line break with concurrent ruptures of steam-generator tubes. Postma, A.K.; Hesson, G.M.; Faletti, D.W. (Pacific Northwest Lab., Richland, WA (USA)). Feb 1983. Contract AC06-76RL01830. 59p. (PNL—3794). NTIS (US Sales Only), PC A04/MF A01 - GPO $5.00. Order Number DE83008319.

Iodine transport in the primary and secondary cooling systems of a pressurized water reactor following a postulated steam line break with concurrent rupture of steam generator tubes was analyzed. The goal of the study was a conservative estimate of the quantity of iodine which could escape from the break to the atmosphere. Ionic iodine, elemental iodine, and methyl iodide were studied. Ionic iodine was the dominant species and its release was governed by the carryover of atomized primary water. The number of ruptured tubes was treated as a parameter. While both an instantaneous and a linear release of iodine from fuel pins to the primary coolant were included in the models, it was found that the instantaneous release dominated because the blowdown transient (IRT Code calculations) lasted just a few minutes. The fraction of an instantaneous iodine source term (total of the three forms) which could escape from the steam line break was predicted to be 3.7% for one ruptured tube and 12.5% for five ruptured tubes. Thus most of the iodine released from the fuel as a result of the postulated accident will be retained within the primary and secondary coolant systems.

20717 (NUREG/CR—2680-Rev.1) Equipment fragility data base. Seismic Safety Margins Research Program. Cover, L.E. (Lawrence Livermore National Lab., CA (USA)). 10 Jan 1983. Contract W-7405-ENG-48. 109p. (UCRL—53038-Rev.1). NTIS, PC A06/MF A01 - GPO. Order Number DE83007347.

Part of the effort of the Seismic Safety Margins Research Program (SSMRP) has been directed at generating a fragility data base for equipment used in control and safety systems in commercial nuclear power plants. Component fragility data have been compiled in various forms, depending on their content, intended use, and level of reduction. The data are stored in a relational data base on the LLNL CEC 7600 computers; this provides easy accessibility for LLNL computer users. This report describes the present structure of the data base and presents its contents through the use of tables. This report is a revision of an earlier one of the same name and numbers (NUREG/CR-2680) and (UCRL-53038). Additional data have been included and the presentation has been revised to enhance its usability.

20718 (NUREG/CR—2800) Guidelines for nuclear-power-plant safety-issue-prioritization information development. Andrews, W.B.; Gallucci, R.H.V.; Heaberlin, S.W.; Bickford, W.E.; Konzek, G.J.; Strenge, D.L.; Smith, R.I.; Weakley, S.A. (Pacific Northwest Lab., Richland, WA (USA)). Feb 1983. Contract AC06-76RL01830. 273p. (PNL—4297). NTIS, PC A12/MF A01 - GPO $8.00. Order Number DE83008244.

Pacific Northwest Laboratory has developed a methodology, with examples, to calculate - to an approximation serviceable for prioritization purposes - the risk, dose and cost impacts of implementing resolutions to reactor safety issues. This report is an applications guide to issue-specific calculations. A description of the approach, mathematical models, worksheets and step-by-step examples are provided. Analysis using this method is intended to provide comparable results for many issues at a cost of two staff-weeks per issue. Results will be used by the NRC to support decisions related to issue priorities in allocation of resources to complete safety issue resolutions.

20719 (NUREG/CR—2809-Vol.3) Aerosol Release and Transport Program. Quarterly progress report, July-September 1982. Adams, R.E.; Tobias, M.L. (Oak Ridge National Lab., TN (USA)). Mar 1983. Contract W-7405-ENG-26. 36p. (ORNL/TM—8397-Vol.3). NTIS, PC A03/MF A01 - GPO. Order Number DE83008030.

This report summarizes progress for the Aerosol Release and Transport Program sponsored by the Nuclear Regulatory Commission's Office of Nuclear Regulatory Research, Division of Accident Evaluation, for the period July-September 1982. Topics discussed include: (1) the source-term experimental program in the Fuel Aerosol Simulant Facility; (2) NSPP experiment 601 involving the generation of mixed concrete-iron oxide aerosols in steam; (3) small vessel tests of plasma torch techniques for concrete aerosols; (4) technical support work for the Marviken and DEMONA test progams; (5) core-melt experiments involving cesium vaporization and manganese release; (6) summaries of calculational results obtained in the ABCOVE exercise; (7) hot-film anemometer experiments on fan-mixer effects in the NSPP.

20720 (NUREG/CR—2849) Comparison of COMPARE and BEACON subcompartment analyses of Battelle-Frankfurt containment tests. Idar, E.S.; Lime, J.F.; Gido, R.G. (Los Alamos National Lab., NM (USA)). Jan 1983. Contract W-7405-ENG-36. 73p. (LA—9461-MS). NTIS, PC A04/MF A01 - GPO $5.00. Order Number DE83007959.

This report presents the results of computations performed with the COMPARE/MOD1 and BEACON/MOD3 computer codes for selected Battelle-Frankfurt loss-of-coolant accident experiments. COMPARE is used widely to perform nuclear power plant containment subcompartment analyses, and BEACON is an advanced multiphase, multidimensional best-estimate code. The objective of this study was to evaluate the margins of COMPARE calculations by comparing them with BEACON calculations and test data. The calculations were performed for the Battelle-Frankfurt D3, D6, and C9 tests. Descriptions of the two codes and the Battelle-Frankfurt experiments are included. Comparisons of the codes' calculations and experimental data for absolute pressure, differential pressure, and temperature are presented for margin evaluation. Evaluations of the sensitivity of BEACON calculations to variations in model noding, form loss, and vent area modeling are prsesented. Conclusions summarizing the results of the COMPARE margin evaluation and BEACON sensitivity studies are given as well.

20721 (NUREG/CR—3028) Review of the Limerick Generating Station Probabilistic Risk Assessment. Papazoglou, I.A.; Karol, R.; Shiu, K.; Fiarman, S.; Lederman, L.; Ludewig, H.; Pratt, W.T.; Bari, R.A. (Brookhaven National Lab., Upton, NY (USA)). Feb 1983. Contract AC02-76CH00016. 410p. (BNL-NUREG—51600). NTIS, PC A18/MF A01 - GPO $9.50. Order Number DE83008246.

A review of the Probabilistic Risk Assessment of the Limerick Generating Station was conducted with the broad objective of evaluating its risks in relation to those identified in the Reactor Safety Study (WASH-1400). The review included a technical assessment of the assumptions and methods used in the Limerick study. It also included a re-evaluation of the main results within the scope and general methodological framework of the study. This included both qualitative and quantitative analyses of accident initiators, data bases, accident sequences which result in core damage, core melt phenomena, fission product behavior, and offsite consequences. Specific comparisons were made between the Limerick study, the Brookhaven review, and the WASH-1400 reactor for the core damage frequency and the average frequencies of acute and latent fatalities. The effect of uncertainties was considered throughout the review process and the uncertainty bands for the risk indices were quantified.

20722 (NUREG/CR—3069-Vol.1) **Interaction of electromagnetic pulse with commercial nuclear-power-plant systems. Volume I. Executive summary.** Ericson, D.M. Jr.; Strawe, D.F.; Sandberg, S.J.; Jones, V.K.; Rensner, G.D.; Shoup, R.W.; Hanson, R.J.; Williams, C.B. (Sandia National Labs., Albuquerque, NM (USA)). Feb 1983. Contract AC04-76DP00789. 42p. (SAND—82-2738/1). NTIS, PC A03/MF A01 - GPO $4.75. Order Number DE83007880.

It has been recognized for many years that the detonation of a nuclear weapon at high altitude leads to the creation of an intense electromagnetic field of very short duration, the electromagnetic pulse (EMP). The EMP from a single burst at the proper altitude could induce large currents and voltages in electrical equipment over the entire continental United States. Commercial nuclear power plants are not required to have protection against EMP. Therefore, the study has the following objectives: determine the vulnerability of systems required for safe shutdown of a specific nuclear plant to the effects of EMP; establish how any safe shutdown systems vulnerable to EMP may best be hardened against it; and characterize to the extent possible, the effects of EMP on nuclear plants in general based upon the results for systems in the example plant. The systems of concern in an example plant were identified and defined. Then, estimates were made of the currents and voltages which might exist at key points if the plant were subjected to EMP. Concurrently, component damage thresholds were estimated. These two sets of estimates were combined to assess the vulnerability of selected components. Because nuclear plants are complex, a modest experimental program was conducted to verify (or reject) conclusions reached about signal distribution and attenuation in the plant electrical systems.

20723 (NUREG/CR—3069-Vol.2) **Interaction of electromagnetic pulse with commercial nuclear-power-plant systems.** Ericson, D.M. Jr.; Strawe, D.F.; Sandberg, S.J.; Jones, V.K.; Rensner, G.D.; Shoup, R.W.; Hanson, R.J.; Williams, C.B. (Sandia National Labs., Albuquerque, NM (USA)). Feb 1983. Contract AC04-76DP00789. 421p. (SAND—82-2738/2). NTIS, PC A18/MF A01 - GPO $11.00. Order Number DE83007881.

This study examines the interaction of the electromagnetic pulse from a high altitude nuclear burst with commercial nuclear power plant systems. The potential vulnerability of systems required for safe shutdown of a specific nuclear power plant are explored. EMP signal coupling, induced plant response and component damage thresholds are established using techniques developed over several decades under Defense Nuclear Agency sponsorship. A limited test program was conducted to verify the coupling analysis technique as applied to a nuclear power plant. The results are extended, insofar as possible, to other nuclear plants.

20724 (NUREG/CR—3126) **Semiscale Mod-2A Intermediate Break Test series: test-results comparison.** Boucher, T.J.; Dimenna, R.A. (EG and G Idaho, Inc., Idaho Falls (USA)). Jan 1983. Contract AC07-76ID01570. 51p. (EGG—2238). NTIS, PC A04/MF A01. Order Number DE83007847.

Results are presented from an analysis of Semiscale Mod-2A Intermediate Break Tests S-IB-1, -2, and -3. The tests were 100% (percentage of cold leg pipe flow area), 50%, and 21.7%, respectively, communicative cold leg break loss-of-coolant experiments. They were intended to provide reference data for evaluation and assessment of reactor safety code capabilities to predict integral blowdown, refill/reflood experiments for intermediate break sizes, and, particularly, to provide data to extend the code into the reflood regime. Comparisons of Semiscale intermediate break test results with those from large and small break tests provided characterization of the phenomena observed during the intermediate break tests. An additional objective of Test S-IB-3 was to provide reference data for comparison of Semiscale test results with results from LOFT Test L5-1 and LOBI Test B-R1M.

20725 (ORNL/TM—8554) **Comparative study of water boiling in a vertical tube under temperature-controlled or heat-flux-controlled boundary conditions.** Carbajo, J.J. (Oak Ridge National Lab., TN (USA)). Mar 1983. Contract W-7405-ENG-26. 35p. NTIS, PC A03/MF A01.

The Simulant Boiling Flow Visualization (SBFV) loop is an experimental facility where natural-convection boiling of water was accomplished in a transparent vertical tube by using hot glycerine; thus, direct observation was possible. As a result, heating was obtained through a temperature-controlled rather than a power-controlled boundary condition. To compare the SBFV data with previous experiments using a stainless steel test section and a power-controlled boundary condition, a comparative study of the effect on water boiling with the two different boundary conditions was performed. The computer program LOOP-W was used for this purpose. This program has been used successfully in analyzing data from the SBFV, and it was modified so that analogous cases could be run with the two different boundary conditions.

20726 (PNL-SA—10409) **Investigation of flow recirculation in a rod bundle during natural-convection flow and power transients.** Fort, J.A.; Bates, J.M.; Rector, D.R.; Khan, E.U. (Pacific Northwest Lab., Richland, WA (USA)). Jan 1983. Contract AC06-76RL01830. 45p. (CONF-830103—42). NTIS, PC A03/MF A01. Order Number DE83007053.

From 2. international topical meeting on nuclear reactor thermal hydraulics; Santa Barbara, CA, USA (11 Jan 1983).

An experimental investigation conducted at the Pacific Northwest Laboratory studied the flow recirculation phenomenon in a rod bundle during natural-convection flow and power transients. The experimental data were used to validate the recirculation model in the COBRA-WC computer program. The COBRA-WC code was then used to predict the flow and temperature fields in a prototypic Liquid Metal Fast Breeder Reactor (LMFBR) blanket assembly for a worst-case, natural-convection transient. The geometry of the 2 x 6 rod bundle was chosed to facilitate direct velocity measurements by Laser Doppler Anemometry (LDA). The rod bundle power skews ranged from uniform bundle power to 1:0, including 2:1, 3:1, 4:1, and the bundle average Reynolds number ranged from 1400 to 200 for steady flows as well as for a number of 45-sec flow transients. Application of the COBRA-WC code to a prototypic blanket assembly for a worst-case natural-circulation transient shows that, although flow recirculation does occur, the temperature in the recirculating channels is well below the peak assembly temperature.

20727 (PNL-SA—10557) **COBRA-WC pretest predictions and post-test analysis of the FOTA temperature distribution during FFTF natural-circulation transients.** Khan, E.U.; George, T.L.; Rector, D.R. (Pacific Northwest Lab., Richland, WA (USA)). 23 Jun 1982. Contract AC06-76RL01830. 7p. (CONF-830103—41). NTIS, PC A02/MF A01. Order Number DE83007045.

From 2. international topical meeting on nuclear reactor thermal hydraulics; Santa Barbara, CA, USA (11 Jan 1983).

The natural circulation tests of the Fast Flux Test Facility (FFTF) demonstrated a safe and stable transition from forced convection to natural convection and showed that natural convection may adequately remove decay heat from the reactor core. The COBRA-WC computer code was developed by the Pacific Northwest laboratory (PNL) to account for buoyancy-induced coolant flow redistribution and interassembly heat transfer, effects that become important in mitigating temperature gradients and reducing reactor core temperatures when coolant flow rate in the core is low. This report presents work sponsored by the US Department of Energy (DOE) with the objective of checking the validity of COBRA-WC during the first 220 seconds (sec) of the FFTF natural-circulation (plant-startup) tests using recorded data from two instrumented Fuel Open Test Assemblies (FOTAs). Comparison of COBRA-WC predictions of the FOTA data is a part of the final confirmation of the COBRA-WC methodology for core natural-convection analysis.

20728 (PNL-SA—10833) **CLEAR: a model for the calculation of evacuation-time estimates in Emergency Planning Zones.** McLean, M.A.; Moeller, M.P.; Desrosiers, A.E. (Pacific Northwest Lab., Richland, WA (USA)). Jan 1983. Contract AC06-76RL01830. 26p. (CONF-830126—2). NTIS, PC A03/MF A01. Order Number DE83007052.

From Conference on modeling and simulation on microcomputers; San Diego, CA, USA (27 Jan 1983).

This paper describes the methodology and application of the computer model CLEAR (Calculates Logical Evacuation And Response) which estimates the time required for a specific population density and distribution to evacuate an area using a specific transportation network. The CLEAR model simulates vehicle departure and movement on a transportation network according to the conditions and consequences of traffice flow. These include handling vehicles at intersecting road segments, calculating the velocity of travel on a road segment as a function of its vehicle density, and accounting for the delay of vehicles in traffice queues. The program also models the distribution of times required by individuals to prepare for an evacuation. CLEAR can calculate realistic evacuation time estimates using site specific data and can identify troublesome areas within an Emergency Planning Zone.

20729 **(UCID—19115-Rev.1) Technical evaluation report (Revision 1) on the proposed design modifications and technical specification changes on grid voltage degradation for the Peach Bottom Atomic Power Station, Units 2 and 3.** Selan, J.C. (Lawrence Livermore National Lab., CA (USA)). 11 Mar 1983. Contract W-7405-ENG-26. 14p. NTIS, PC A02/MF A01. Order Number DE83008427.

This report is a revision of the technical evaluation documented in a separate report dated November 3, 1981 (UCID-19115) on the proposed design modification and Technical Specification changes for the protection of the Class 1E equipment from grid voltage degradation for the Peach Bottom Atomic Power Station, Units 2 and 3. The review criteria are based on several IEEE standards and The Code of Federal Regulations. The evaluation compares the submittals made by the plant with the NRC staff positions and the review criteria. The evaluation finds that the proposed design modifications and the required changes to the Technical Specifications will ensure that the Class 1E equipment will be protected from sustained voltage degradation.

20730 **Post accident debris cooling.** Mueller, U.; Guenther, C. (eds.). Karlsruhe, Germany; G. Braun (1983). 378p. (CONF-820717—). Sheridan House Inc., 175 Orawaupum Street, White Plains, NY 10606 $30.00.

From PAHR information exchange conference; Karlsruhe, F.R. Germany (28 Jul 1982).

The meeting is considered a continuation of a series of four earlier Information Exchange Meetings on POST ACCIDENT HEAT REMOVAL (PAHR). The previous meetings were organized by Sandia Laboratories at Albuquerque in 1974 and 1975, by Argonne National Laboratories in 1977, and by the Ispra Establishment of the Joint Research Center of the European Communities in 1978. The aim of the meeting was to summarize the present understanding of debris cooling phenomena and, moreover, to foster the exchange of information and ideas among specialists on PAHR-problems related to Fast Breeder and Light Water Reactors. Topics include: debris bed formation and debris bed properties; debris bed experiments and interpretation (LMFBR); heat removal from particle beds (LWR-HTR); experimental test facilities and programs; interaction of core debris with underlying structural materials; computation modeling of PAHR phenomena; and core debris retention concepts.

20731 **Post-service examination of the EBR-II superheater duplex tubes.** Longua, K.J.; Buzzell, J.A.; Porter, D.L. (Argonne National Laboratory, P.O. Box 2528, Idaho Falls, ID 83401). *Transactions of the American Nuclear Society;* **41**: 301(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

20732 **Federal radiological assistance.** Combs, G. *Transactions of the American Nuclear Society;* **41**: 422(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

20733 **(ORNL-tr—4960) Influence of cladding on the values of K_1 for emerging defects in the vessel belt line: semi-elliptical flaws; longitudinal flaws.** Lance, C.; Robisson, F.; Pellissier-Tanon, A. (Oak Ridge National Lab., TN (USA)). 1982. Contract W-7405-ENG-26. Translation source information not available . 96p. NTIS, PC A05/MF AO1. Order Number DE83007240.

While the usual analyses done on nuclear components account well for the presence of the cladding in the thermoelastic analyses, the calculation of K is generaly done, on the other hand, ignoring the presence of the latter (presence of cladding). The purpose of this study is to give the order of magnitude of the influence of the cladding on the K_1 observed for an emerging defect on the internal skin, longitudinal or semi-elliptical, and accounting for the real state of stresses observed in the cladding and the base metal. The discontinuity of stresses at the interface of the stainless steel and base metal due to different coefficients of thermal expansion is accounted for. The effect of residual stresses after final stress relieving treatment is also considered. The case of the core ferrule (belt line) subjected to a LOCA (Loss of Coolant Accident) is studied.

25 ENERGY STORAGE

2501 Magnetic

REFER ALSO TO CITATION(S) 20267, 22764

2505 Flywheels

20734 **(PB—82-232919) Physical properties data compilations relevant to energy storage. V. Mechanical properties data on alloys for use in flywheels.** Ledbetter, H.M. (National Measurement Lab. (NBS), Washington, DC (USA)). [nd]. 38p. NTIS, PC A03/MF A01.

This report deals with the physical and mechanical properties of twenty-one commercial alloys that are candidates for flywheel rotors used as inertial-energy-storage systems. Base metals include aluminum, iron, and titanium. Alloys vary in complexity from simple carbon steels to superalloys. Properties include: mass density, Young's modulus, shear modulus, bulk modulus, Poisson's ratio, yield strength, ultimate strength, fatigue strength, fracture toughness, and creep strength. Property values were collected from many types of sources and were analyzed statistically to detect possible outlying values. For each alloy, the report contains typical chemical composition, typical heat treatment, metallurgical descriptions, and typical property values. The report also shows the variations of these properties and the relative abundances of experimental property values. (Copyright (c) 1982, by the Secretary of Commerce on Behalf of the United States Government.)

20735 **(PB—82-238130) Stationary flywheel energy storage systems. Final report.** Gilhaus, A.; Hau, E.; Gassner, G.; Huss, G.; Schauberger, H. (Maschinenfabrik Augsburg-Nuernberg (M.A.N.) A.G., Muenchen (Germany, F.R.)). Jul 1982. Translation of Stationare Schwungrad-Energiespeicher, n.p., 1981.;. 111p. NTIS, PC A06/MF A01.

Advance in materials, e.g., the development of high-strength fiber composite materials, today makes possible the building of flywheel storage systems with high energy storage densities. A report is given of a study intended to discover industrial applications of Stationary Flywheel Energy Accumulators. The economic value for the consumer and the effects on the power supply grid were investigated. Up to now, Stationary Flywheel Energy Accumulators have only had limited use. The main reason for thinking of the application in a wider range was the hope that they could be used economically for lowering the demanded maximum output of the power supply grid. The possible savings in energy costs however, have proved to be too small for recovering the investment costs. An additional possibility for energy storage by flywheels exists where energy otherwise lost can be used effectively is brake energy storage in vehicles. The future use of flywheels in wind power plants also seems to be promising. Attractive savings of energy can be obtained by introducing modern flywheel technology for emergency power supply units which are employed, for instance, in telecommunication systems.

2506 Thermal

REFER ALSO TO CITATION(S) 20140, 20964

20736 (CONF-810940—13) **Development of natural stratification technology.** Cole, R.L. Bellinger, F.O. (Argonne National Lab., IL (USA)). 1981. Contract W-7405-ENG-26. 9p. NTIS, PC A02/MF A01. Order Number DE82000117.

From Annual contractors' review meeting on thermal and chemical storage; Tysons Corner, VA, USA (16 Sep 1981).

The development of natural stratification of water in sensible heat storage tanks is studied, and comparisons of experimental data with diffusion theory equations are made. A simple 1-D model of stratification that gives good results is presented and verified with measured tank performance. A stratification index is introduced that allows a rapid comparison to be made of tank performance data. A semi-empirical equation is given that will allow a prediction to be made regarding the tank operating performance providing that an empirical constant related to the mixing heights may be evaluated. A method to estimate a value for the constant is given for the case of a tank with a side inlet and outlet. Implications of stratification in regard to overall system control strategy are discussed. The goal is to provide system designers with the guidelines necessary to assure the establishment and maintenance of stratification and to take advantage of it.

20737 (NP—3900022) **Layout of a latent heat storage system with finned tubes.** Wolff, D. (Dortmund Univ. (Germany, F.R.). Abt. Chemietechnik). 26 Oct 1980. 157p. (In German). NTIS (mf) (US Sales only).. Order Number DE83900022.

Thesis. Microfiche only, copy does not permit paper copy reproduction.

The theoretical and experimental investigations show by the example of Glauber's salt in a finned-tube latent heat storage vessel how heat transfer and storage capacity at charging and discharging depend on the variables of geometry, temperature, time and on the composition of the storing medium. By vertical arrangement of transversely finned tubes the separation problems occurring with Glauber's salt are solved insofar as the technical utilization of the latent heat of conversion corresponding to the complete conversion during charging and discharging not being possible, no decrease, of the reduced storage capacity, however, is found even after very many charging/discharging cycles. For the heat transfer during discharging correlations can be given on the basis of a model concept, be means of which a heat transfer coefficient, varying during the discharging process, can be predicted almost for the total range of discharge as a function of geometry, temperature and state of discharge. On the basis of the simple working formula for the heat transfer coefficient at crystallization of a latent heat storing medium the dynamic behavior of a compact finned-tube storage vessel can be predicted by means of a computer code. These means allow to perform the thermal design of a compact latent heat storage facility according to given design criteria accounting for economic aspects.

20738 (PB—82-232331) **Seasonal thermal storage: Swedish practice, developments and cost projections.** Margen, P. (Statens Raad foer Byggnadsforskning, Stockholm (Sweden)). 1981. 33p. NTIS, PC A03/MF A01.

The report reviews the types of heat store being developed in Sweden for seasonal storage of heat. This type of storage allows summer excess heat from industrial waste heat plants, garbage burning plants and future central solar heat stations to be stored for winter use on district heating networks. Whereas above ground steel or concrete tanks are usually too expensive, insulated earth pits, uninsulated rock caverns and deep ground schemes using rock or clay promise to achieve sufficiently low costs to justify storage when supplied with free or cheap summer heat. For all these concepts demonstration plants have been or are being built in Sweden.

20739 (PNL—4587) **Aquifer thermal-energy-storage costs with a seasonal-chill source.** Brown, D.R. (Pacific Northwest Lab., Richland, WA (USA)). Jan 1983. Contract AC06-76RL01830. 65p. NTIS, PC A04/MF A01. Order Number DE83006700.

The cost of energy supplied by an aquifer thermal energy storage (ATES) system from a seasonal chill source was investigated. Costs were estimated for point demand and residential development ATES systems using the computer code AQUASTOR. AQUASTOR was developed at PNL specifically for the economic analysis of ATES systems. In this analysis the cost effect of varying a wide range of technical and economic parameters was examined. Those parameters exhibiting a substantial influence on the costs of ATES delivered chill were: system size; well flow rate; transmission distance; source temperature; well depth; and cost of capital. The effects of each parameter are discussed. Two primary constraints of ATES chill systems are the extremely low energy density of the storage fluid and the prohibitive costs of lengthy pipelines for delivering chill to residential users. This economic analysis concludes that ATES-delivered chill will not be competitive for residential cooling applications. The otherwise marginal attractiveness of ATES chill systems vanishes under the extremely low load factors characteristic of residential cooling systems. (LCL)

20740 (PNL-SA—11128) **United States Department of Energy aquifer thermal-energy-storage field-test facilities.** Raymond, J.R.; Allen, R.D.; Kanneberg, L.D. (Pacific Northwest Lab., Richland, WA (USA)). Jan 1983. Contract AC06-76RL01830. 11p. (CONF-830208—1). NTIS, PC A02/MF A01. Order Number DE83006615.

From 7. meeting of the IEA solar heating and cooling program; Innsbruck, Austria (5 Feb 1983).

The US DOE has two field test facilities (FTF) for measuring the performance of and technical problems associated with aquifer thermal energy systems (ATES). The high temperature (>100°C) FTF is on the University of Minnesota campus at St. Paul. The low temperature (<100°C) FTF is near Mobile, Alabama. The design and operation of the FTF's are discussed. (LCL)

2509 Batteries

REFER ALSO TO CITATION(S) 20032, 21022, 21023, 21024, 21027, 21028

20741 (AD-A—116381/5) **Studies leading to the development of high-rate lithium sulfuryl chloride battery technology. Quarterly report No. 1, 1 Sep-31 Dec 81.** Marikar, F. (Gould, Inc., Rolling Meadows, IL (USA). Gould Labs.-Energy Systems). Mar 1982. 56p. NTIS, PC A04/MF A01.

The overall aim of the program is an examination of the viability of an active electrolyte lithium/sulfuryl chloride battery system. The specific objectives are to quantify the stability of lithium in sulfuryl chloride solutions; explore the means to improve the stability of lithium; and establish the limits of performance of carbon/teflon cathodes in sulfuryl chloride electrolytes. During this quarter we measured the rates of corrosion of lithium in sulfuryl chloride in cells and sealed capsules by microcalorimetry; estimated by complex plane impedance measurements; followed the growth of the film on cell storage, its disruption on polarization and its healing following polarization; established the baseline cathode performance; and measured the conductivity and density of SO_2Cl_2-$LiAlCl_4$ electrolysis at ambient and high temperature.

20742 (BMFT-FB-T—81-053) **Development of gas phase metallized plaques for electrodes of storage batteries, in particular for nickel oxide electrodes. Final Report, Jul. 1979.** Linkohr, R.; Schladitz, H. (Deutsche Automobilgesellschaft m.b.H., Esslingen (Germany, F.R.)). Jun 1981. 87p. (In several languages). NTIS, PC A05/MF A01.

Nickel oxide electrode plaques for alkaline batteries were developed by nickel carbonyl vapor deposition plating on large fiber plaque substrates made of carbon. The most promising technique is the one in which carbonyl gas flows continuously through the carbon felt, allowing continuous processing as well as improved uniformity of the nickel distribution. Structural strength, electrical resistance, heat conduction, and gas permeation of the plaques were approximated by simple models which are borne out by experimental comparison it is indicated that electrochemical measurements in half cell arrangements are reached for nickel savings, capacity per unit area, and current capability. (ESA)

20743 **(BMFT-FB-T—81-100) Nickel-iron battery of high energy density. Final Report, Jul. 1980.** Kraemer, G.; Oliapuram, V.A.; Lexow, K.W.; Horn, K.G. (Varta Batterie A.G., Kelkheim (Germany, F.R.). Forschungs- und Entwicklungszentrum). Jul 1981. 163p. (In several languages). NTIS, PC A08/MF A01.

The energy and power densities of conventional Nickel-Iron accumulators at about 26 wh/kg (5 h) and 18 w/kg (1 h) respectively are rather low. By using active materials of high utilization, electrode construction with low-weight support, light cell containers, and less electrolyte with gas recombination specific values of 45 wh/kg (5 h) and 35 w/kg (1 h) can be obtained as well as short-time load peaks of about 100 w/kg. An elastic casing is an essential feature of the new battery. The reversible pressure-volume changes can be used as a state-of-charge indicator. Production procedures, experimental results and recommendations for use are given. A 1 kwh battery has been completed.

20744 **(CONF-821106—28) In-situ determination of dimensional changes of electrodes in LiAl/FeS cells during cycling.** Shimotake, H.; Anderson, K.E.; Gay, E.C. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 31p. NTIS, PC A03/MF A01. Order Number DE83007730.

From Annual meeting of heat transfer and energy conversion; Los Angeles, CA, USA (14 Nov 1982).

The positive and negative electrodes of Li-Al/FeS cells undergo unique dimensional changes during cycling. Quantitative measurements of such changes are important in order to improve the cell designs and operational modes. The electrode behavior during cycling was monitored by a high sensitivity transducer. Changes in dimension were measured to the nearest +-2 μm in situ.

20745 **(CONF-821211—5) NASIGLAS electrolyte for sodium/sulphur cells.** Susman, S.; Nelson, P.A. (Argonne National Lab., IL (USA)). Oct 1982. Contract W-31-109-ENG-38. 8p. NTIS, PC A02/MF A01. Order Number DE83007636.

From 5. DOE battery and electrochemical contractors' conference; Crystal City, VA, USA (7 Dec 1982).

NASIGLAS compositions corresponding to the stoichiometries Na/sub 1+x/Zr/sub 2-x//$_3$Si/sub x/P/sub 3-x/O/sub 12-2x//$_3$ have been prepared by batch pressing from a 1600 to 1650°C melt. The range of compositions extends from $x = 3$ to $x = 2.25$. Evidence of phase separation and crystallization become more apparent at the higher phosphate compositions. Optical microscopy and x-ray diffraction indicate trace quantities of γ-Na_3PO_4 at $x \leqq 2.5$. For $x=3$, the glass transformation temperature determined by DTA is 995 K and the crystallization temperature is 1250 K (measured at a heating rate of 25°C/min.). Ionic conductivities were measured by the complex admittance method and results are given. (WHK)

20746 **(CONF-8010159—14) Transient-current distributions in porous zinc electrodes in KOH electrolyte.** Liu, M.B.; Cook, G.M.; Yao, N.P. (Argonne National Lab., IL (USA)). 1980. Contract W-31-109-ENG-38. 36p. NTIS, PC A03/MF A01. Order Number DE83007684.

From Fall meeting of the Electrochemical Society; Hollywood, FL, USA (5 Oct 1980).

Transient-current distributions were measured in porous zinc electrodes at current densities ranged from 24 to 240 mA/cm^2 in 7.24 N KOH saturated with ZnO. The current distributions were highly nonuniform. The reaction penetration depth was initially about 0.015 cm and decreased gradually to about 0.008 cm at steady state. The current distribution change occurring during passivation of the electrode was measured. The analysis of the experimental data indicate that the high nonuniformity of current distributions was due to high electrolyte resistance compared with both the charge-transfer resistance and the diffusion resistance of OH$^-$ ions. A model incorporating a surface blockage mechanism by compact ZnO formation did not completely predict the observed passivation behavior of the electrode. It was suggested that the passivation of the electrode may have been caused by pore plugging.

20747 **(CONF-8105105—6) Effect of electrolyte conductance on current distribution in porous zinc electrode in KOH electrolyte.** Liu, M.B.; Cook, G.M.; Yao, N.P. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 11p. NTIS, PC A02/MF A01. Order Number DE83007646.

From Symposium on electrocatalyis; Minneapolis, MN, USA (10 May 1981).

An analysis of the current distributions in porous zinc electrodes is presented which indicates that the current distributions are indeed controlled by the conductivity of the electrolyte within the porous structure. (WHK)

20748 **(DOE/ET/29368—T13) Modeling and computerized characterization of lead-acid battery discharges. Battery Energy Storage Test (BEST) Facility.** Hyman, E.A. (Public Service Electric and Gas Co., Newark, NJ (USA)). Jan 1983. Contract AC02-76ET29368. 92p. NTIS, PC A05/MF A01. Order Number DE83008368.

Characterization of the discharge performance of large-scale, lead-acid battery subunits has been implemented at the BEST Facility via computer-adjusted parameter values of a new empirical performance model fitted to time-series data for each subunit. The model, which includes relaxation effects, accurately fits electrical behavior during various time-varying current discharges: very deep discharges, interrupted discharges, high start/low finish, high finish/low start, parabolic and rapid sinusoidal current variations. Cell data fitted was obtained from cells of four different sizes, two of which are antimony grid and two of which are calcium grid. Sample applications illustrating the usefulness of the model, and a discussion of characterization methodology results are presented. This report is produced at a time when routine battery cycling at the BEST Facility is beginning. The BEST Facility data set analyzed is limited (ten discharges). This report, therefore, emphasizes validation of the techniques used. It is expected that substantive results from use of the characterization technique will be available in about one year.

20749 **(DOE/ET/29368—T14) SCOPE: the BEST facility data analysis and reporting system. Battery Energy Storage Test (BEST) Facility.** Hyman, E.A. (Public Service Electric and Gas Co., Newark, NJ (USA)). Jan 1983. Contract AC02-76ET29368. 29p. NTIS, PC A03/MF A01. Order Number DE83008392.

The Battery Energy Storage Test (BEST) Facility is a national test facility for battery energy storage systems. SCOPE is the BEST Facility data storage and analysis system. SCOPE is an acronym standing for STORE - CHARACTERIZE - ORGANIZE - PRESENT - EVALUATE. The term SCOPE SYSTEM denotes hardware, system and applications software, procedures, and personnel assembled to support the data processing needs of BEST Facility operation. This report is not a technical manual nor is it a user manual. This document is intended to describe what the SCOPE system is and what it can do. This report addresses the new or prospective user. (WHK)

20750 **(EUR—7595-EN/Vol.2) Advanced electrochemical energy storage devices.** Tofield, B.C. (Commission of the European Communities, Luxembourg). 1982. 264p. Available from the Commission of the European Communities, Luxembourg.

The introduction of electric vehicles is of particular importance to Europe where there is a special need to economise in oil consumption for strategic and economic reasons, and for long-term resource conservation. The development of improved batteries is the most urgent need to facilitate the more widespread acceptance of electric vehicles in the market-place. Other important reasons for supporting battery development are to facilitate the operations of electric utilities, and for providing storage capability for solar or wind-generated electricity. Our programme has the additional aim of assisting the European battery industry to satisfy the new demand in Europe and to compete for overseas markets. Battery-systems currently under engineering development are reviewed in Sub-Projet IV, cell configurations in Sub-Project II and electrolyte requirements in Sub-Project III and Sub-Project IV. Work on two advanced, high-temperature batteries, sodium-sulphur and lithium-iron sulphide, has been carried out within the frame of the European Communities' Research and Development Programme in Energy Conservation, 1975-79. All systems currently under development for vehicle propulsion pose such considerable technical or environmental problems that there can be no guarantee of any of them making a successful entry into the market-place. Similar drawbacks apply to batteries for utility applications and for storage of renewable energy.

20751 (NP—3900028) **Year-book of the Deutsche Gesellschaft fuer Chronometrie e.V. Vol. 32.** (Deutsche Gesellschaft fuer Chronometrie e.V., Stuttgart (Germany, F.R.)). 1981. 148p. (In German). NTIS (US Sales Only), PC A07/MF A01. Order Number DE83900028.

When developing new energy sources the battery manufacturer has to observe the various operating conditions to be applied like cell dimensions, load capability, energy density, self-discharge and operating voltage. The mutual dependence of desired cell properties will be discussed for alkaline systems, lithium systems as well as for solid electrolyte systems, which has to be observed in future time also in order to choose an adequate system that permits an optimal operation of the electronic wrist watch.

20752 (SAND—83-7013C) **Simple model of Exxon's Zn/Br_2 battery.** Van Zee, J.; White, R.E.; Grimes, P.G.; Bellows, R.J. (Texas A and M Univ., College Station (USA). Dept. of Chemical Engineering; Exxon Research and Engineering Co., Linden, NJ (USA). Advanced Energy Systems Labs.). 1983. Contract AC04-76DP00789. 26p. (CONF-830308—6). NTIS, PC A03/MF A01. Order Number DE83007839.

From American Institute of Chemical Engineers national meeting; Houston, TX, USA (27 Mar 1983).

A simple model of Exxon's Zn/Br_2 battery is presented and used to predict the energy efficiency of the battery for various electrolyte resistivities and cell geometries. Efficiencies of greater than 75% are predicted by the model.

29 ENERGY PLANNING AND POLICY

REFER ALSO TO CITATION(S) 22893

20753 (DOE/EIA—0205(82/4Q)) **Energy Information Directory. Fourth quarter 1982.** (National Energy Information Center, Washington, DC (USA)). 1982. 71p. NTIS, PC A04/MF A01. Order Number DE83008028.

This directory is a list of many of the government offices that are involved in energy matters. The offices are classified according to their specialities. For the purposes of this publication, each office has been given an alphanumeric identification symbol (A-01, A-02, etc.). The subject index uses these identification symbols instead of page numbers in referring the reader to relevant entries. Most entries provide an abbreviated office address. For the complete address, consult the Index of Building Locations. Following the name and title is the DOE routing symbol which refers to the organization and is a part of the mailing address.

20754 (DOE/TIC/EGC—82/4) **Energygrams: brief descriptions of energy technology.** (Department of Energy, Oak Ridge, TN (USA). Technical Information Center). 1982. 100p. (PB—82-903604). NTIS $8.00.

Energygrams: Brief Descriptions of Energy Technology, is a compilation of technical notes (called Energygrams) published by the Technical Information Center. The Center instituted the Energygram program to help fulfill a mission of the US Department of Energy (DOE) to transfer information and technology generated from DOE-sponsored research to identifiable audiences in industry, education, and federal, state, and local government. The Technical Information Center routinely screens all DOE R and D reports to identify appropriate information. It also coordinates with DOE and DOE laboratory and contractor program managers in identifying research and development projects for the transfer program and in reviewing the technical content of Energygrams before publication.

20755 (ESC—22) **Integral energy scenarios and models for the Netherlands.** van Oostvoorn, F. (ed.). (Karlsruhe Univ. (TH) (Germany, F.R.). Inst. fuer Beton und Stahlbeton). Nov 1982. 161p. (In Dutch). NTIS (US Sales Only), PC A08/MF A01. Order Number DE83901340.

In 1980 an informal Working Group on Integral Energy Scenarios (WIES) was formed to present a framework for discussion on scenarios. To exchange insights and know-how on scenarios a number of lectures were given by different members. This has now resulted in a collection of papers on scenarios and their models. This report contains an overview, followed by a collection of invited papers. The papers aim at giving background information of several scenarios and energy models. Five studies of scenarios are presented. Chapter one contains a short description of a study on long term socio-political developments in the Netherlands. This study starting with the policy environment of scenarios will soon be published. Two energy models, a simulation model and an L.P.-model, are presented in chapter two and three. Also two input-output models are presented in chapters four and five. Chapter six contains a description of models and methods used to estimate long term supply and demand of natural gas. In chapter seven the planning tools and methods used for estimation of long term electricity supply are shown. A low energy growth scenario is described in chapter eight. This scenario is supported by no-nuclear groups and environmentalists. Finally, chapter nine shows a complete energy scenario developed by the Ministry of Economic Affairs.

2901 Energy Analysis And Modeling

REFER ALSO TO CITATION(S) 19698, 19711, 19713, 20289, 20771, 20802, 20849

20756 (AD-A—121950/0) **Energy forecasting models within the Department of the Navy. Master's thesis.** Buttolph, L.W. (Naval Postgraduate School, Monterey, CA (USA)). Jun 1982. 307p. NTIS, PC A14/MF A01.

Executive Order 12003 requires that all federal activities reduce their energy consumption by 20% from fiscal year 1975 by fiscal year 1985. The Defense energy Information System (DEIS II) provides a system of measuring, reporting, and comparing energy use levels in pursuit of that goal. The use of regression and time series models of energy use were examined for application within the present DEIS II system. A data base of monthly electricity use, gross floor areas , four weather variables, and building area category identification codes were used in a framework study of 12 Naval Regional Medical Centers. Specific methodologies for model development, interpretation, and application to a control system are demonstrated and discussed.

20757 (DOE/EIA—0202/9-2) **Short-term energy outlook. Volume II. Methodology.** (USDOE Energy Information Administration, Washington, DC. Office of Energy Markets and End Use). Nov 1981. 86p. NTIS, PC A05/MF A01. Order Number DE83008096.

Analytical techniques and methodologies used to prepare the short-term energy forecasts published in Volume I of the November 1981 Outlook are presented. This technical presentation is intended for those readers interested in details of the methods behind the forecasts published in Volume I.

20758 (DOE/EIA—0267, pp 8-144) **Overview of the arc forecasts.** 1980. NTIS, PC A99/MF A01.

In Annual report to Congress, 1979. Volume 3. Projections; energy programs/energy markets-overview; energy programs/energy markets-technical papers.

This chapter groups discussion of energy projections by EIA division directors in charge of coordinating these, as well as independent energy analysts. (PSB)

20759 (DOE/EIA—0267, pp 145-233) **Oil and gas.** 1980. NTIS, PC A99/MF A01.

In Annual report to Congress, 1979. Volume 3. Projections; energy programs/energy markets-overview; energy programs/energy markets-technical papers.

This chapter discusses work done in oil and gas area by US EIA. Panel reviews are presented by L.A. Rapoport, B.C. Ball, R. Griffin, R.D. Guerin, E. Murphy, R.C. Sparling, and David Lindahl. (PSB)

20760 (DOE/EIA—0267, pp 344-390) **Macroeconomic effects.** 1980. NTIS, PC A99/MF A01.

In Annual report to Congress, 1979. Volume 3. Projections; energy programs/energy markets-overview; energy programs/energy markets-technical papers.

An overview of the macroeconomic elements in energy forecasting is presented. Panel members were: W. Curtis, K.A. Mork, S. Thurman and R. Dohner. (PSB)

20761 (DOE/EIA—0267, pp 391-465) **Demand.** 1980. NTIS, PC A99/MF A01.

In Annual report to Congress, 1979. Volume 3. Projections; energy programs/energy markets-overview; energy programs/energy markets-technical papers.

Parameters that are used for constructing energy demand models are presented by T. Morlan and reviewed by a panel consisting of R. Itteilag, W.R. Patterson, M. Rodekohr, R. Halvorsen, and J. Neri. (PSB)

20762 (DOE/EIA—0267, pp 466-489) **Welcome and introduction to review of energy policy study.** 1980. NTIS, PC A99/MF A01.

In Annual report to Congress, 1979. Volume 3. Projections; energy programs/energy markets-overview; energy programs/energy markets-technical papers.

An overview of EIA policy making and forecasting energy use is given. The role of the panelists in defining EIA's policy limits and comparing how that policy interacts with other energy programs is given. (PSB)

20763 (DOE/EIA—0267, pp 490-511) **Political and policy perspectives on the report's findings.** 1980. NTIS, PC A99/MF A01.

In Annual report to Congress, 1979. Volume 3. Projections; energy programs/energy markets-overview; energy programs/energy markets-technical papers.

This chapter addresses the attempt to extrapolate the effects that would have followed if a different energy policy had been chosen. Conclusions were it was an impossible task. (PSB)

20764 (DOE/EIA—0267, pp 512-564) **Energy policy in managing the transition.** 1980. NTIS, PC A99/MF A01.

In Annual report to Congress, 1979. Volume 3. Projections; energy programs/energy markets-overview; energy programs/energy markets-technical papers.

Government's role in energy policy is discussed using the Applied Analysis Program as a basis. More emphasis on emergency plans was urged. A deficiency in the focus of the study was seen as a failure to define the government role in urging the market toward its stated policy goals. (PSB)

20765 (DOE/EIA—0267, pp 565-630) **Energy policy and other national concerns.** 1980. NTIS, PC A99/MF A01.

In Annual report to Congress, 1979. Volume 3. Projections; energy programs/energy markets-overview; energy programs/energy markets-technical papers.

Effects of the interrelation between energy policy and income distribution, macroeconomics and inflationary interrelations, and the interaction with environmental problems are discussed. Panel speakers are: R.H. Haveman, L. Ruff, D.W. Jorgenson, B. Bosworth, and L.C. Thurow. (PSB)

20766 **(EUR—6762-FR-Vol.3) Development of optimization model for energy system program analysis and models of energy systems.** (Institut Economique et Juridique de l'Energie, Grenoble (France)). 1980. 61p. (In French). European Community Information Service, 2100 M Street, NW, Suite 707, Washington, DC 20037.

20767 **(PB—82-221714) The energy supply model 'MESSAGE'. Final report.** Schrattenholzer, L. (International Inst. for Applied Systems Analysis, Laxenburg (Austria)). [nd]. 42p. NTIS, PC AE03/MF E03.

This report describes the general form of an energy supply model called MESSAGE (Model for Energy Supply Systems And their General Environmental impact). MESSAGE is a dynamic linear programming model minimizing total costs of energy supply over a given time horizon. It balances secondary energy demand with primary energy supply. The model permits definitions of load regions, distinguishes between indigenous and imported resources, and takes account of the environmental impact of energy supply strategies. The most important application of MESSAGE is in the description of the IIASA global energy scenarios. A set of models and formalized procedures, each describing one part of the energy system, is arranged as a loop. Iterative application of the model loop leads to globally consistent scenarios in the development of the global energy system. The important relation for MESSAGE in this loop is with the energy demand model MEDEE-2 which provides the demand data for MESSAGE. Information on energy costs flows back to the demand model. MESSAGE can be used as a stand-alone model, and can also be applied to geographical regions other than the world regions of the global study.

20768 **(PB—82-227208) Long-term alternative energy R and D strategies. Final report.** (Commission of the European Communities, Luxembourg). [nd]. 52p. NTIS, PC AE04/MF E04.

A previous study by the Institute for Applied Systems Analysis dealt in detail with the long-term global energy problem. The present study represents an attempt to transfer the global results to the lower level of the 'sub-region' comprising the European Community so that they may be used as an interface between global and national levels. A further aim is to identify long-term energy R and D strategies for selected European countries which would be consistent with the global scenarios already identified. The on-going analysis is based on previously reported results of model runs for the energy/demand balance of 'Region III', comprising Western, Northern and Southern Europe, Japan, Australia, New Zealand, Oceania, Israel and South Africa, as well as for the energy/supply balance of nine European countries. The first stage was the disaggregation of the economic growth and energy demand and of the energy supply systems of Region III into sub-regions, one of which represents the EEC. Appendix 1 contains the results of the re-calculation of the final energy demand spectrum for the 50 year period until 2030. Appendix 2 contains the results of a re-calculated energy supply pattern for the sub-regions.

20769 **Energy analysis: as an economic tool.** Slesser, M. Ispra, Italy; Commission of the European Communities (1979). 67p. (EUR—6387-EN). European Community Information Service, 2100 M Street N.W., Suite 707, Washington, DC 20037.

Energy analysis is about estimating the energy resource required to make a given good or service available on the market place, and then interpreting that information within a theoretical framework. The methodology is established, and fairly widely accepted among the scientific community if not within the economic community. Differences still exist with respect to system boundary, but these are slowly being resolved.

2902 Economics And Sociology

REFER ALSO TO CITATION(S) 19425, 19426, 19650, 19651, 19652, 19653, 19656, 19674, 19692, 19693, 19694, 19695, 19696, 19697, 19700, 19701, 19708, 19714, 19715, 19717, 19746, 19754, 19755, 19756, 19757, 19758, 19759, 20248, 20465, 20808, 20813, 20837, 20850, 20851, 21026, 21885, 21887

20770 (CONF-811275—1) Energy-pricing policies and their implications: a case study for a planned economy. Liu, B.; Wyant, F. (Oklahoma City Univ., OK (USA); Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 25p. NTIS, PC A02/MF A01. Order Number DE83007824.

From Allied Social Science Association annual meeting; Washington, DC, USA (28 Dec 1981).

The primary objective of this study is to illustrate a benefit-cost cross-impact assessment framework by which the positive and negative impacts of energy pricing subsidies versus the proposed marginal cost pricing in developing countries in general and those in Egypt in particular are delineated. The varying impacts of the two energy pricing policies in Egypt are compared and evaluated quantitatively. In addition to the direct impacts of domestic energy pricing policies, the indirect effects of these policies on US energy pricing policy options and international energy resources development alternatives are examined. In summary, the preliminary study findings seem to be in favor of the marginal cost pricing policy over the existing public subsidies in Egypt as far as the energy planning goals or objectives for the country are concerned. However, it should be stressed that this study is more of a conceptual evaluation focusing on methodological development than an empirical or statistical assessment for Egypt, due to both data deficiencies and study limitations.

20771 (DOE/EI/10750—T1) Establishment of leading energy indicators. Final report. (Triton, Washington, DC (USA)). 14 Dec 1981. Contract AC01-80EI10750. 48p. NTIS, PC A03/MF A01. Order Number DE83007184.

Using financial and operating data collected by the Financial Reporting System (FRS) of DOE from energy producing firms, a methodology for analyzing energy time series was developed around the National Bureau of Economic Research (NBER) Algorithm for identifying cycles and identifying lead-lag relationsips. Although current FRS data are insufficient for this purpose, it is anticipated that the potential indicators will evolve with improved data compilation. (PSB)

20772 (DOE/EIA—0349/2) Energy company development patterns in the postembargo era. An overview of financial performance, 1974-1980. Volume 2, statistical tables. (Department of Energy, Washington, DC (USA). Energy Information Administration). Oct 1982. 117p. NTIS, PC A06/MF A01. Order Number DE83008002.

Aggregate financial and operating data were reported by the 26 major energy companies in tabulated form. The purpose of the second volume is to make the aggregate financial and operating data readily available to analysts and policy-makers, in both the private and public sectors, who have an interest in energy and financial performance. This report provides information useful for the development of energy and financial policy both in the public and private sectors. Economic performance, in financial and physical dimensions, continues to serve as the most significant factor in evaluating past decisions and guiding future options in the development and supply of energy resources. The information contained in this report is intended to promote an understanding and a critical review of the motivations and consequences of corporate investment decisions in the energy area.

20773 (EPRI-EA—2837) Air-pollution damage to man-made materials: physical and economic estimates. Final report. Stankunas, A.R.; Unites, D.F.; McCarthy, E.F. (TRC Environmental Consultants, Inc., East Hartford, CT (USA)). Feb 1983. 85p. NTIS, PC A05/MF A01. Order Number DE83901464.

This report considers the damage to three materials from SO_2 air pollution in a northeastern urban area (Boston). The three materials studied were paint, galvanized steel, and structural concrete (exclusive of paving). Using a field survey of 357 individual sites, the study estimated the quantities of these materials exposed to different concentrations of SO_2 for the entire urban study area and for the neighborhoods. Given the quantities of exposed materials, the study attempted to present economic estimates of the damage from SO_2 to the study materials. No adequate damage function could be found for concrete; hence, no estimate of the SO_2 damage to concrete is possible. The damage to paint varied considerably depending upon the damage function used, thus reflecting the uncertainty of the estimate. For the entire urban study area, the annual damage to paint ranged from $830,000 to $31,300,000. For galvanized steel, the estimated annual damage from SO_2 for the total study area was only $335,000. Estimates of damage are also presented by neighborhood. Some of the fundamental concepts necessary for materials damage estimates are reviewed in an appendix to the report. There is also a discussion of several key papers that previously estimated material damage from SO_2.

20774 (HSDPD—9/UNUP-11) Goals, processes, and indicators of development: a project description. Galtung, J. (United Nations University, Tokyo (Japan)). 1978. 45p. United Nations University, Toho Seimei Building, 15-1 Shibuya 2-chome, Shibuya-ku, Tokyo 150, Japan.

The five features listed below were studied to contribute to new theories and practices of development: focus is on development of people in security, welfare, identity, and freedom; a developed country guarantees an acceptable minimum of these basic needs in conformity with constraints set by nature and ecological balance; a methodological emphasis on dialog between people and planners interacting to create a world network for integrated research projects. A suggested format for the first year is presented. (PSB)

20775 (PB—82-238676) Vehicle operating costs, fuel consumption, and pavement type and condition factors. Final report Sep 79-Oct 81. Zaniewski, J.P.; Butler, B.C.; Cunningham, G.; Elkins, G.E.; Paggi, M.S. (Texas Research and Development Foundation, Austin (USA)). Mar 1982. 375p. NTIS, PC A16/MF A01.

This report presents updated vehicle operating cost tables which may be used by a highway agency for estimation of vehicle operating costs as a function of operational and roadway variables. These results, partially based on fuel consumption tests on a group of late model vehicles and on a survey of truck fleet owners, are representative of the advancement in vehicle propulsion technology and increase in unit prices since the last comprehensive study of vehicle operating cost was conducted in the United States. To make the procedure flexible to changes in unit prices, consumption rates of the major vehicle cost components are presented in tables of constant speed on vertical grades, constant speed on horizontal curves, speed change cycles, and idling for each vehicle classification.

20776 Energy and education: planning for higher prices and potential shortages. Petrock, E.M.; Bauman, P.C. Denver, CO; Education Commission of the States (Jul 1982). 62p. (DOE/IR/10903—T1). Education Commission of the States, Suite 300, 1860 Lincoln St., Denver, CO 80295. Contract FG05-80IR10903.

This publication focuses on information generally not available in current energy plans: revised federal policies, characteristics of state energy contingency documents, planning considerations, fuel characteristics and energy supply management techniques. Also included are the conclusions and recommendations made by the State Energy and Education Task Force, chaired by the Honorable Richard D. Lamm, governor of Colorado, and composed of policy makers and experts in energy and education matters. The annotated bibliography lists sources of information for monitoring energy-related data, a sampling of state developed energy conservation and emergency plans and other related references.

2903 Environment, Health, And Safety

REFER ALSO TO CITATION(S) 19578, 20292, 20624, 20773, 20837, 21026, 21680, 21690, 21692, 21748, 21815, 21816, 21817, 21820, 21821, 21830, 21831, 21844, 21845, 21846, 21847, 21851, 21882, 21888, 21889, 21990

20777 (CONF-820970—, pp A.3-A.25) **CO_2 research program of CEC.** Fantechi, R. (Commission of the European Communities, Brussels, Belgium). Feb 1983. NTIS, PC A23/MF A01.

From Carbon dioxide research conference: carbon dioxide, science and consensus; Berkeley Springs, WV, USA (19 Sep 1982).

Projects described relate to the global carbon cycle and possible climatic changes due to increased carbon dioxide concentration in the atmosphere. Parameters studies include ocean relationships, especially water-air interactions; environmental transport; atmospheric chemistry changes that may occur through pollution abatement efforts; synergistic effects of carbon monoxide, nitrogen oxides, and methane; stratospheric trends; forecasting greenhouse effects in Europe and globally; modeling ecological concentration from archival data; transport and interaction in subantarctica regions; socioeconomic impacts; and transport with minerals in major river systems. (PSB)

20778 (ORNL/TM—8310) **Wilderness designation of Bureau of Land Management lands and impacts on the availability of energy resources.** Oakes, E.H.; Voelker, A.H. (Oak Ridge National Lab., TN (USA); Science Applications, Inc., Oak Ridge, TN (USA)). Feb 1983. Contract W-7405-ENG-26. 101p. NTIS, PC A06/MF A01. Order Number DE83008306.

In 1964 Congress mandated the establishment of the National Wilderness Preservation System - a collection of federal lands dedicated to the preservation of selected parts of our once vast wilderness. Because wilderness management precludes many traditional land uses, controversy has plagued the efforts of land-management agencies to select and recommend areas for wilderness inclusion. This study examines potential impacts on the supply of energy resources from the possible withdrawal by the Bureau of Land Management (BLM) of some part of the 24.3 million acres of public lands now under study for inclusion in the wilderness system. Except for uranium, the energy-resource potential of the total WSA-acreage is low. Wilderness designation of some WSAs is therefore not expected to cause serious impacts on the future availability of energy resources. Because the significance of land withdrawals by the BLM will depend to some extent on the availability of other federal lands for mineral activities, an up-to-date estimate of the current and future status-of-access to western federal lands for mineral activities was prepared. Overall conclusions of the report are that (1) the inclusion of some BLM land in the National Wilderness Preservation System will not interfere with the nation's required supply of energy resources, (2) there is sufficient federal land currently available in the West for mineral activities, (3) the availability of western federal land for mineral activities will increase in the future, (4) the administration should continue to support the major land-review programs, and (5) the administration should accelerate the review process for WSAs in regions that have a high energy-resource potential.

20779 (PB—82-230459) **Research outlook 1982.** (Environmental Protection Agency, Washington, DC (USA). Office of Research and Development). Apr 1982. 135p. NTIS, PC A07/MF A01.

This edition is a five-year strategy document which describes how the EPA research program plans to address major issues. Each chapter relates to the research applicable to a segment of the Agency's regulatory program. Within each chapter, an introduction defines the area of concern, a section on legislated responsibilities indicates the laws which engender the research program and the body discusses major gaps in scientific and technical knowledge and how they are to be filled to assure a cost-effective regulatory program. The chapters also present selected milestones which indicate the timing of important segments of the research program and resource options for conditions of high, moderate and no growth. These growth scenarios are intended to indicate potential program increases in the Agency's research and development. The chapters in the report are: Energy, Hazardous Air Pollutants, Gases and Particles, Oxidants, Mobile Sources, Pesticides, Radiation, Toxic Chemical Testing and Assessment, Hazardous Wastes, Superfund, Drinking Water, Water Quality, Industrial Wastewater, Municipal Wastewater.

20780 (PB—82-237421) **AEROS manual series. Volume III: summary and retrieval manual. update number 2.** (Environmental Protection Agency, Research Triangle Park, NC (USA). Office of Air Quality Planning and Standards). Apr 1979. 345p. NTIS, PC A15/MF A01.

The AEROS Summary and Retrieval Manual (Vol. III) describes the reporting and analysis capabilities of the various AEROS systems. The reports available from each of the major systems are described and their retrieval options are explained. Sample computer printouts are used to illustrate the report formats. This manual also describes the analysis packages available for use in the evaluation of AEROS data and describes the user access procedures for obtaining AEROS reports. It describes the standard publications available from the NADB to provide information on emissions and air quality. It also provides specific examples of applications of AEROS data and the use of AEROS reports in typical air quality control activities. The manual also gives an overview of the Comprehensive Data Handling System (CDHS), which is an AEROS-related system for storing and reporting air quality and emission data.

2904 Natural Resources

REFER ALSO TO CITATION(S) 19599, 19655, 19710, 20757, 20778

20781 (CONF-8110257—1) **Partial-equilibrium model for long-term price and supply in world metal markets.** Macal, C.M.; Hill, L.G. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 29p. NTIS, PC A03/MF A01. Order Number DE83007668.

From ORSA/TIMS joint national meeting; Houston, TX, USA (11 Oct 1981).

This paper describes a model to estimate long-term world prices of metals that could be in short supply in the future. A time-stepped simulation model solves for market equilibrium prices and interregional flows in successive time periods using a quadratic programming algorithm. Preliminary results are presented on the application of the model to estimate price impacts of nickel requirements by nickel-zinc electric vehicle batteries. 5 figures, 3 tables.

2905 Research, Development, Demonstration, And Commercialization

REFER ALSO TO CITATION(S) 20143, 20864, 21890

20782 (GAO/RCED—83-6) **Analysis of the energy research and development budget proposal process.** (General Accounting Office, Washington, DC (USA). Resources, Community and Economic Development Div.). 5 Nov 1982. 26p. General Accounting Office, P.O. Box 6015, Gaithersburg, MD 20760.

Information on the energy research and development (R and D) budget proposal process is presented. In view of the magnitude of the proposed changes for fiscal year 1983 and the continuing congressional interest in the energy R and D area, we reviewed the process underlying the administration's fiscal year 1983 energy R and D budget proposal. This report describes: (1) how the fiscal year 1983 energy R and D budget was developed, (2) the roles played by the Department of Energy and Office of Management and Budget officials, and (3) factors that influenced decisions made on the budget.

2906 Nuclear Energy

REFER ALSO TO CITATION(S) 20405, 20426, 20427, 20428, 20465, 20477, *21831*

20783 (ERG—035) **The nuclear controversy: unequal competition in public policy-making.** Sanderson, I. (Open Univ., Milton Keynes (UK)). May 1980. 76p. NTIS, PC A05/MF A01.

The public policy making process as regards nuclear power is analyzed and the epistemological basis for such an analysis is examined. It is asserted that disputes over the development of nuclear power are not primarily about the objective facts of the matter but rather derive from differences in basic assumptions about, and evaluatory perceptions of, society, technology and the nature of progress. The balance of power in such disputes is therefore not mainly determined by the 'correctness' of the facts upon which a position rests but rather by the extent to which underlying assumptions and values accord with prevailing ideological themes. A meaningful debate can be guaranteed only through the establishment of institutional structures which provide a framework of truely democratic participation and equality of power and influence.

20784 **Fusion: Where we are and where we're going.** Clarke, J.F.; Dowling, R.J. (Department of Energy, Washington, DC, (USA). Office of Fusion Energy). *Journal of Nuclear Materials;* **111**: vp(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN, USA (3 - 7 May 1982).

Status of the U.S. magnetic fusion energy program with respect to the Administration's position on fusion energy, composition and technical status of the program, and strategy for the future including a brief review of the 1983 budget are discussed.

2907 Transport And Storage

REFER ALSO TO CITATION(S) 19654, 20806

2908 Waste Heat Utilization

REFER ALSO TO CITATION(S) 20247, 20277, 20874, 20964, 20968, 20996, 21004, 21005

2910 Conservation

REFER ALSO TO CITATION(S) 20799, 20802, 20843, 20849, 20893, 20896, 20898, 20904, 20905, 20907, 20911, 20912, 20913, 20919, 20934, 20944, 20962, 20965, 20988, 21008

20785 (GAO/EMD—82-110) **Analysis of two allegations about the Tennessee Valley Authority's energy-conservation programs and their efficiency and effectiveness.** (General Accounting Office, Washington, DC (USA). Energy and Minerals Div.). 11 Aug 1982. 7p. General Accounting Office, P.O. Box 6015, Gaithersburg, MD.

Two allegations were investigated regarding the Tennessee Valley Authority's energy conservation programs. Regarding the first allegation, it was found that TVA was slow to respons to a request for a home inspection that was necessary for the complainants to qualify for a low interest heat pump loan. TVA officials cited poor communications, abnormally large backlog, and loss of two energy advisors as circumstances contributing to the oversight. The second allegation was made by a former TVA energy advisor that he was fired for disclosing improprieties in the home insulation program. Two lawsuits resulted; the first seeking a copy of TVA's investigations of the complainant's charges, and the second asserting that the former employee had been defamed in a statement released to a local newspaper. Types of energy conservation programs sponsored by TVA are identified., as well as how the programs are organized and administered, and the scope of activity under each program. 9(LEW)

20786 (PB—82-238536) **Federal energy conservation programs. Perspectives from the public and private sectors: Volume I. Summary of a public hearing, July 14 and 15, 1981, Washington, DC.** (REAP Associates, Inc., Washington, DC (USA)). May 1982. 50p. NTIS, PC A03/MF A01.

Section 11 of the Federal Nonnuclear Research and Development Act mandates an annual public hearing on the adequacy of attention to energy conservation method and the environmental consequences of the application of energy technologies. This report summarizes the views of 88 individuals and groups who testified at the Section 11 hearing July 14 and 15, 1981 in Washington, D.C., or who submitted written testimony. The hearing focused on the federal governments' energy conservation programs. A wide range of opinions was presented including the views of utilities, trade groups, state and local governments, conservation businesses and advocacy groups. A complete transcript of oral and written testimony is available as Volume II of this report.

20787 (PB—82-238544) **Federal energy conservation programs. Perspectives from the public and private sectors: Volume II. Public hearing, July 14 and 15, 1981, Washington, DC.** (REAP Associates, Inc., Washington, DC (USA)). May 1982. 470p. NTIS, PC A20/MF A01.

The 1981 National hearing on Section 11 of the Federal Nonnuclear Research and Development Act was held July 14 and 15, 1981 in Washington, D.C. The hearing focused on the federal governments' energy conservation programs. This transcript presents the testimony of 88 individuals and groups who testified at the hearing, or who submitted written testimony. Testimony regarding issues discussed at the hearing included energy policy, benefits of energy conservation, state and local governments and private sector activities, successes and failures of federal programs, barriers to conservation and a continuing federal role. A summary of the oral and written testimony is available as Volume I of the report.

2920 Supply, Demand, And Forecasting

REFER ALSO TO CITATION(S) 19652, 19653, 19654, 19672, 19691, 19698, 19702, 19703, 19704, 19705, 19706, 19708, 19709, 19712, 19714, 19719, 19754, 19755, 19756, 20758, 20759, 20761, 20766, 20810, 20846, 20847, 20848, 20946, 20954, 20955

20788 (CONF-8110257—2) **Energy-sector-model applications in energy assessments of industrializing and developing countries.** Macal, C.M. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 39p. NTIS, PC A03/MF A01. Order Number DE83007685.

From ORSA/TIMS joint national meeting; Houston, TX, USA (11 Oct 1981).

A description is given of the use at Argonne National Laboratory of energy-sector models in national energy planning for developing and industrializing countries. An equilibrium approach is used to project future fuel prices and supplies. The methodology for developing and applying the models to Portugal, Argentina, and South Korea is discussed, based on the Argonne experience.

20789 (DOE/EIA—0008(82/3Q)) **Energy information. Quarterly report: third quarter, 1982.** (Department of Energy, Washington, DC (USA). Energy Information Administration). Dec 1982. 45p. NTIS, PC A03/MF A01. Order Number DE83008043.

Report to Congress.

This report contains energy information including imports of crude oil, petroleum products, natural gas, and coal; reserves and production of crude oil, natura gas, and coal; refinery activities; and petroleum inventories.

20790 (DOE/EIA—0267) **Annual report to Congress, 1979. Volume 3. Projections; energy programs/energy markets-overview; energy programs/energy markets-technical papers.** (Maryland Univ., College Park (USA). Coll. of Business and Management). 1980. Contract FG01-80EI10672. 712p. NTIS, PC A99/MF A01. Order Number DE83006457.

This contractor report is an edited transcript of the proceedings of a two-day symposium, held at the University of Maryland on August 7-8, 1980. The symposium was held in order to independently review the Energy Information Administration's (EIA) Annual Report to Congress, 1979 - Volume Three: Projections, Energy Programs/Energy Markets-Overview and Energy Programs/energy Markets-Technical Papers. These reports were delivered to the Congress and the public by August 1980. Participants included energy experts from academia, government and the private sector. The government sector was represented by local, state and federal government energy experts, most notable being EIA staff members from the Office of Applied Analysis. The symposium and these proceedings cover the underlying assumptions, methodologies, and energy system projections presented in the three reports.

20791 (DOE/EIA—0267, pp 1980) **Utilities.** 1980. NTIS, PC A99/MF A01.

In Annual report to Congress, 1979. Volume 3. Projections; energy programs/energy markets-overview; energy programs/energy markets-technical papers.

This chapter reviews the coal and electric utilities dispatch and capital expansion models. Forecasts are contrasted with 1978 figures and major changes which acted to influence the predicted consumption demand are discussed. Panel members were: R. Eynon, R. Gordon, F. Keady, M. Baughman, J. Karaganis, R.G. Clark, J.O. Roberts, J.J. McSweeny, and L. Mills. (PSB)

20792 **(EUR—7780-EN) Input data for the Federal Republic of Germany for the energy demand model MEDEE-3.** Ruehle, G.; Scheirle, N.; Thoene, E.; LeVan, T.; Zeidl, D. (Institut fuer Kerntechnik und Energiewandlung e.V., Stuttgart (Germany, F.R.)). 1982. 188p. European Community Information Service, 2100 M Street, N.W., Suite 707, Washington, DC 20037.

The report summarizes the results of an interdisciplinary national group of experts from the Federal Republic of Germany in the compilation of a data base for the energy demand model MEDEE-3. The IEJE provisional data base was examined, corrected, completed and validated.

20793 **(NP—3900159) Econometrical model of the energy demand of New York State.** Chatterji, M. (Muenster Univ. (Germany, F.R.). Sonderforschungsbereich 26 Raumordnung und Raumwirtschaft). Feb 1981. 26p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83900159.

Some general remarks are made on energy scenarios in New York State and the econometrical model of the energy demand is described. The development of the pertinent equations is presented.

20794 **(NP—3901213) Texas energy history.** Burnett, D.R.; Chang, J. (Texas Energy and Natural Resources Advisory Council, Austin (USA)). Nov 1982. 114p. Texas Energy and Natural Resources Advisory Council, Energy Policy Div., 200 East 18th St., Austin, TX 78701.

This publication provides an overview of historical reserves, production, transmission, conversion, consumption, and valuation of energy in Texas. The Graphic Summary contains graphs comparing energy industry in the United States and Texas. Section II contains Texas data series from 1960 to the present.

20795 **(P—105-82-005) Securing California's energy future. Draft 1983 biennial report to the Governor and the Legislature.** (California Energy Resources Conservation and Development Commission, Sacramento (USA)). Nov 1982. 351p. California Energy Commission, 1516 Ninth Street, Sacramento, CA 95814.

The Draft 1983 Biennial Report assesses energy supply and consumption of resources available to California; evaluates ways in which projected energy consumption rates could be reduced through increased energy efficiency and conservation; assesses a variety of electricity and nongenerating energy technologies and the issues surrounding their development and commercial deployment; indicates the amount and types of new electrical generating capacity which may be needed to meet forecasted demand levels; and describes potentially adverse social, economic, and environmental impacts which could result from continuing current trends of energy supply and consumption.

20796 **(PB—82-217605) Energy models of European communities implementation and methodological tests in Italy. Final report.** (Commission of the European Communities, Luxembourg). 1981. 56p. (EUR—7289-EN). NTIS PC E04/MF E04.

The strategy employed to obtain a meaningful involvement of Italian users in energy model implementation together with the difficulties encountered are outlined. The methodological tests carried out on the EXPLOR and EFOM models are described in detail. The EXPLOR model is used to analyze energy demand for various sectors. Two EFOM models were analyzed, the first evaluating the behaviour of the model under reference conditions and the second evaluating alternative cases where variations have been added to take account of the costs of nuclear investment, the cost of imported crude oil and the constraints on coal imports. The results do not give meaningful indications for energy planning and decision making but can be regarded as a preliminary methodological exercise showing the capabilities and potentialities of the models. When properly used, the models should give a better understanding of the energy system structure, facilitate the evaluation of decision factors, improve energy policy planning and provide a reference energy system framework for arriving at a concensus on alternative strategies.

20797 **(PB—82-219262) Trends in energy demand in Italy (energy demand model for Italy). Final report.** (Commission of the European Communities, Luxembourg). [nd]. 152p. (EUR—7304-IT). NTIS PC E07/MF E07.

This report describes the research into an energy demand model (EDM) for Italy and its integration into the EEC model EXPLOR. The results of the research are described and discussed, and some suggestions for further areas of research are made. A detailed analysis is made of the EDM/Italy data base, trends in final demand of energy, EDM Battelle-Frankfurt results, a comparison of the Frankfurt and Cambridge models, and tables relating to the linkage from EXPLOR/EDM to EFOM 12CB.

2930 Policy, Legislation, And Regulation

REFER ALSO TO CITATION(S) 19746, 19961, 20055, 20210, 20762, 20763, 20765, 20777, 20783, 20790, 20794, 20795, 20812, 20813, 20815, 21888

20798 (DOE/EIA—0267, pp 631-679) **Wrap-up session on energy policy study.** 1980. NTIS, PC A99/MF A01.

In Annual report to Congress, 1979. Volume 3. Projections; energy programs/energy markets-overview; energy programs/energy markets-technical papers.

All panel moderators were given ten minutes to capsule their gleanings from the proceedings. The final chapter summarizes each panel members contributions to the meeting. (PSB)

20799 **(GAO/ID—82-60) Priority support for energy programs under the Defense Production Act.** (General Accounting Office, Washington, DC (USA)). 1982. 5p. US General Accounting Office, P.O. Box 6015, Gaithersburg, MD.

Administrative procedures used by the Departments of Energy and Commerce to implement section 101 (c) of the Defense Production Act of 1950 are presented, specifically as they pertain to priorities for steel to meet future energy requirements. Information obtained on the section 101 (c) program from the Commerce and Energy Departments indicates that its authority has been used sparingly and has not significantly affected producers and suppliers of domestic steel or other materials and equipment. From program inception in 1977 through June 30, 1982, the Energy Department received only 50 applications for priority rating; it sent 32 applications to Commerce for further processing, turned down 16 as not being eligible for priority rating, and still was processing 2 as of June 30, 1982. Commerce authorized priority ratings for 23 of the 32 applications and denied priority ratings for 9 of them. Of these 32 applications, 21 involved steel material; 13 of them related to Alaskan North Slope projects, 6 to coal projects, 1 to the Strategic Petroleum Reserve, and 1 to natural gas. Commerce authorized priority ratings for 14 of the 21 applications.

20800 (N—82-18707) **National energy research and development program.** (Serice de la Programmation de la Politique Scientifique, Brussels (Belgium)). 1980. 23p. (In French). NTIS, PC A02/MF A01.

This bibliography cites 24 reports generated by a program designed to study the national energy system, possibilities for energy conservation, and the use of new energy sources in Belgium. Topics covered include a mathematical model of the energy system social impacts regional aspects the energy infrastructure compatibilities, energy consumption in buildings and industries the use of solar energy heat recovery and storage and the use of fossil fuels.

20801 (NP—3901020) **Discussion on energy policy in the SPD.** von Oppeln, S. (Freie Univ. Berlin (Germany, F.R.). Fachbereich Politische Wissenschaft). 1980. 128p. (In German). NTIS (US Sales Only), PC A07/MF A01. Order Number DE83901020.

The project on democratic-socialist parties of Western Europe in the FGS Foreign Policy aims at analyzing actual sectors of policy after a phase of intensive theoretical work. It intends to perform systematic comparative studies on the policies of democratic-socialist parties e.g. in the central sectors of agriculture, environmental policy and energy policy. The present preliminary study is to be seen in this research context. As exemplified by the SPD the question for claims and reality, motives and interests of the discussion on energy policy of the SPD is asked. In this form, the study, as an interim result, can not yet do complete justice to the importance of the topic. It is an important approach to the publication of these Occasional Papers to animate the critical discussion on topical issues in research.

20802 (NP—3901671) **Development of standards and program packages. Volume III. Appendices. Final report, Phase 2.** McCarthy, P.M.; Barnes, H.H.; Londner, H.D.; Edmondson, S.E.; Friedlander, S.C. (Applied Management Sciences, Inc., Silver Spring, MD (USA)). 17 Sep 1982. 319p. NTIS, PC A14/MF A01. Order Number DE83901671.

Eighty-two implementation strategies are analyzed. Each summary description consists of the following elements: title of the strategy; description of the strategy; appropriate technologies; barriers designed to overcome; regional evaluations; policy interventions; summary results of the literature; and reference sources. Descriptions are grouped according to the eight market segments for which the strategies were designed: owner occupants, renters, and investors of the residential sector; owner occupants, renters, and investors of the commercial sector; and end-user, and intermediary of the government sector. (PSB)

20803 (PB—82-240045) **Analysis of state regulatory actions regarding rates for buyback electricity and back-up electric service for natural gas cogeneration. Final report.** Podlasek, R.J. (Podlasek (R.J.), Springfield, IL (USA)). Mar 1982. 52p. NTIS, PC A04/MF A01.

The objectives were: (1) To evaluate progress of state regulatory commissions in implementing rates for buyback electricity and back-up electric service for natural gas cogeneration, (2) to determine the underlying methodology utilized by state commissions in developing cogeneration rates, and (3) to identify cogeneration technical parameters which influence the magnitude of buyback and back-up rates.

20804 (PB—82-243072) **The automobile calendar: recent and pending federal activities affecting motor vehicles. Final report.** (Regulatory Council, Washington, DC (USA)). Jan 1981. 399p. NTIS, PC A17/MF A01.

This report provides a comprehensive review of current government activities intended to affect the manufacture, sale, and use of the automobile and other motor vehicles. It is intended to be a pilot, industry-specific calendar, modeled on the Council's Calendar of Federal Regulations, which is published twice a year, in May and November. While the Calendar of Federal Regulations covers only the most important regulatory activities affecting all industries, the Automobile Calendar covers all regulatory activities intended to significantly affect only one industry.

2940 Fossil Fuels

REFER ALSO TO CITATION(S) 19398, 19425, 19426, 19578, 19599, 19650, 19651, 19652, 19653, 19654, 19655, 19656, 19674, 19674, 19675, 19675, 19692, 19693, 19694, 19695, 19696, 19697, 19700, 19701, 19702, 19703, 19704, 19705, 19706, 19708, 19709, 19713, 19714, 19715, 19717, 19737, 19744, 19745, 19746, 19747, 19753, 19754, 19755, 19756, 19757, 19758, 19759, 20249, 20250, 20251, 20252, 20253, 20789, 20789, 20789, 20791, 20853, 20855, 20855, 20855, 20856, 20856, 20856, 20857, 20857, 20857, 20858, 20858, 20858, 20859, 20859, 20859, 20946, 21885

20805 (CONF-810631—7) **Optimum resource use in synfuels development.** Livengood, C.D.; Wilzbach, K.E. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 15p. NTIS, PC A02/MF A01. Order Number DE83007648.

From 74. annual meeting of the Air Pollution Control Association; Philadelphia, PA, USA (21 Jun 1981).

In this paper the question of optimum coal-resource use is examined. One conclusion is that electricity, substituted for oil or gas, is in some areas the most resource-efficient synfuel. The move toward the all-electric home, which has been the historical trend, should be encouraged. The development and commercialization of advanced, high-efficiency power plants will enhance the advantages of such increased residential electrification. The primary advantage will be the energy savings achieved by heat pumps, but other benefits may be anticipated as well, such as the optimization of energy conversion and pollution control at central installations. Direct use of coal should be encouraged at large commercial and industrial installations, where the amount of energy used justifies the additional complexity over gas/oil systems. Coal-derived liquids or gas appear attractive for industry only in existing units or in very small boilers. Fuel shortages may also be critical in transportation. If the petroleum supply is restricted, coal liquids and shale oil will be pressed into service for aircraft fuel and long-distance surface transport. One major source of lost coal energy not addressed here is the failure to extract all of the coal during underground mining. With traditional room and pillar mining methods, coal left in the ground may amount to as much as 50% of the known deposits. Technology advances in this area would greatly enhance resource utilization. In summary, we find that coal synfuels should be developed to cope with shortages of petroleum and natural gas that may arise as resources become depleted (or because of political upheavals). Energy policy-makers should pay greater attention also to the improvement of end-use technologies and the indications they give us for the most efficient use of our resources. 5 figures, 2 tables.

20806 (DOE/EIA—0167(81)P) **Domestic natural gas reserves and production dedicated to interstate pipeline companies, 1981 (preliminary report).** Arnold, J.R. (USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas). 27 Jul 1982. 7p. NTIS, PC A02/MF A01. Order Number DE83008158.

This annual report provides preliminary information on the natural gas reserves of the interstate pipeline companies as requested by the FERC for regulatory purposes. A preliminary compilation of information reported by interstate natural gas pipeline companies to the Energy Information Administration (EIA) on FERC Form 15, Interstate Pipeline's Annual Report of Gas Supply, indicates that domestic natural gas reserves dedicated to the interstate market at the end of 1981 were 98.3 trillion cubic feet (Tcf), an increase of 1.2% from the 97.1 Tcf at the end of 1980. EIA's preliminary compilation indicates that the volume of natural gas produced from dedicated reserves in 1981 totaled 11.6 Tcf, approximately equal to the volume of natural gas produced during 1980.

20807 (GAO/RCED—83-10) **Interior's report of shut-in or flaring wells unnecessary, but oversight should continue.** (General Accounting Office, Washington, DC (USA). Office of the Comptroller General). 5 Oct 1982. 14p. General Accounting Office, P.O. Box 6015, Gaithersburg, MD 20760.

Report to The Congress.

The Interior Department's annual report to the Congress on offshore oil and gas wells shut-in (not producing) or flaring natural gas, as required by the Outer Continental Shelf Lands Act Amendments of 1978, does not satisfy the congressional intent behind the requirement. Furthermore, it is less necessary now because of recent legislative and administrative actions to decontrol oil and gas prices. Repeal of the reporting requirement would free up resources of both the Interior Department and the General Accounting Office - the Comptroller General is required to annually examine and report on Interior's methodology for allowing wells to be shut-in or flare natural gas - for other activities. Interior's monitoring of shut-in and flaring well activities, however, should continue as part of its day-to-day management and oversight of offshore production operations.

20808 **(IIM/IP—81-30) Vertical integration as a source of market power.** Phelps, J.H. (Wissenschaftszentrum, Berlin (Germany, F.R.). Internationales Inst. fuer Management und Verwaltung). Nov 1981. 67p. Available from Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe, Germany, F.R.

Discussion papers.

This paper has put forward a theory of vertial integration where the ability of a group of firms to engage in noncompetitive pricing is increased by altering conjectural variations. An analysis of conditions faced by major oil companies at refining indicated little likelihood of market power, short of a complex, secret price fixing agreement. Vertical integration to branded retail outlets appears to have created the ability to price noncompetitively without overt collusion. More interesting for vertical policy are the results on non price rivalry where excess profits appear to have been turned into social costs.

20809 **(KOM—(81)-229(endg.)) Substitution of coal for petroleum in 'other industries'.** (Commission of the European Communities, Strasbourg (France)). 6 May 1981. 52p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83750302.

The coal share of the primary energy consumption in the European Community has gone down from 57% in 1958 to 19% in 1978. What could motivate today the 'remaining industry' (beside energy sector, steel industry and small trade) to rearrange from crude oil or gas to coal again. Decision criteria can be divided into two groups, namely in technical and financial problems of each undertaking (1), as well as the surrounding data wreath (2). To (1) belong building and waste problems and investment and conversion costs, to (2) above all procurement problems and governmental contributions. Also political viewpoints (sure availability of coal) presumably will contribute to the final decision.

20810 **(NP—3900029) Energy reserves and energy conservation. Pt. 1.** Gruenhagen, J. (Deutsche Presse-Agentur G.m.b.H., Hamburg (Germany, F.R.)). 16 Feb 1981. 14p. (In German). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83900029.

A status report is given on the worldwide reserves of nonrenewable energy sources.

20811 **(NP—3900188) Report of the business year 1980 from 1st January until 31st December 1980.** (Badische Gas- und Elektrizitaetsversorgung A.G., Loerrach (Germany, F.R.)). 1981. 21p. (In German). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83900188.

The annual report of the company had been submitted at the regular general meeting on 1. July 1981. Some explanations on the annual account 1980 are given and the report of the supervisory board is presented. The report of the managing committee is chiefly related to the natural gas deal. The annual balance until 31st December 1980 as well as the profit and loss account are given in the appendix.

20812 **(PB—82-242926) Cooperation and conflict: regulating coal production. Final report.** (Regulatory Council, Washington, DC (USA)). Jan 1981. 70p. NTIS, PC A04/MF A01.

The document is a report of the Regulatory Council Coal Project, which was initiated in response to industry charges that regulatory overlap and conflict adversely affect coal production. In resolving such problems, the Council staff concluded: problems from overlapping and inconsistent regulations occur more frequently between federal and state agencies than between federal agencies; a significant portion of the overlap and inconsistency arises in enforcement; coal operators have been affected by disagreements between the Office of Surface Mining and state agencies on how to implement the new surface reclamation regulatory program; and overlapping reporting requirements and redundant permitting requirements are significant problems.

2950 Hydrogen And Synthetic Fuels

REFER ALSO TO CITATION(S) 19668, 19669, 19919, 19920, 19921, 19922, 19923, 19924, 19925, 19926, 19931

20813 **(GAO/RCED—83-27) Evaluation of administrative procedures at the Synthetic Fuels Corporation.** (General Accounting Office, Washington, DC (USA). Resources, Community and Economic Development Div.). 18 Oct 1982. 63p. General Accounting Office, P.O. Box 6015, Gaithersburg, MD 20760.

Report to The Chairman, United States Synthetic Fuels Corporation.

The Synthetic Fuels Corporation has improved its administrative procedures, but further actions are needed to strengthen contracting practices and internal financial controls. Pertinent recommendations are made in this report. This report also discusses the evolution of the Corporations's current salary structure and the activities of the Office of the Inspector General.

20814 (SERI/CP—231-1873, pp 123-134) **Photo-Kolbe reaction in biomass wastestreams.** Schwerzel, R.E.; Byker, H.J.; Vutetakis, D.G.; Wood, V.E. (Battelle, Columbus Labs., OH). Dec 1982. NTIS, PC A08/MF A01/.

From SERI biomass program principal investigators review meeting; Washington, DC, USA (23 Jun 1982).

The results presented here demonstrate that the photo-Kolbe reaction is part of a much more complex series of reactions than might be anticipated at first sight. A number of competing processes serve to lower the efficiency of hydrocarbon formation, and the search for conditions which will provide a high yield of hydrocarbons under illumination with visible light has so far proved unrewarding. The finding that short-wave ultraviolet light is required to initiate the photo-Kolbe reaction on un-derivatized semiconductor powders is particularly disappointing, as the large-scale production of hydrocarbon fuels with platinized powders would appear to be economically prohibitive. This problem might be alleviated, at least to some extent, by the use of metals other than platinum or by the use of other surface-modification techniques; the photoelectrochemical behavior of such powders is largely unexplored, however. The prospect of producing fuels for heating and transportation from renewable resources and solar energy by means of the photo-Kolbe reaction remains appealing, but at present the realization of this promise seems far from assured.

2960 Electric Power

REFER ALSO TO CITATION(S) 19699, 19710, 19715, 19931, 20248, 20249, 20250, 20251, 20252, 20253, 20254, 20268, 20285, 20286, 20288, 20289, 20761, 20789, 20791, 20794, 20803, 20855, 20856, 20857, 20858, 20897, 21889

20815 **(DOE/CS/40538—T1) Assessment of electric-utility ownership and operation of industrial-cogeneration facilities. Final report.** (Hagler, Bailly and Co., Washington, DC (USA)). Dec 1982. Contract AC02-81CS40538. 151p. NTIS, PC A08/MF A01. Order Number DE83005494.

To better understand the opportunities for direct utility involvement in the ownership and operation of industrial cogeneration facilities, the Department of Energy requested a study of the factors affecting utility ownership and operation of these facilities. The study team, with the assistance of a utility steering committee composed of representatives of 10 major investor-owned utilities, reviewed pertinent laws and regulations, held discussions with key regulatory personnel, defined prototypical ownership and operating arrangements, evaluated cogeneration facility technical characteristics and financial attractiveness, and determined specific measures designed to encourage greater utility involvement in the ownership and operation of industrial cogeneration facilities. This report discusses factors affecting utility involvement in cogeneration facilities, the positive effects of deregulation on such involvement, measures to improve the regulatory environment, and measures to improve the financial performance of utility-owned cogenerating facilities. (LCL)

20816 **(DOE/CS/40538--T2) Assessment of electric-utility ownership and operation of industrial cogeneration facilities. Final report.** (Hagler, Bailly and Co., Washington, DC (USA)). Dec 1982. Contract AC02-81CS40538. 151p. NTIS, PC A08/MF A01. Order Number DE83007985.

The study team, with the assistance of a utility steering committee composed of representatives of 10 major investor-owned utilities, reviewed pertinent laws and regulations, held discussions with key regulatory personnel, defined prototypical ownership and operating arrangements, evaluated cogeneration facility technical characteristics and financial attractiveness, and determined specific measures designed to encourage greater utility involvement in the ownership and operation of industrial cogeneration facilities. Conclusions follows: under current laws and regulations, an unregulated subsidiary of an electric utility with or without a joint venture with an industrial customer is the most attractive ownership and operating arrangement; small natural gas-fired combustion turbines/heat recovery boiler cogeneration systems offer the highest and most stable financial attractiveness to electric utilities; and variations in steam and electricity transaction rates have a greater effect on the financial attractiveness of utility investments in industrial cogeneration facilities than variations in the cost of capital and the financial structure of electric utilities.

20817 **(DOE/EIA--0191(81)) Cost and quality of fuels for electric-utility plants: 1981 annual.** (Department of Energy, Washington, DC (USA). Energy Information Administration). Sep 1982. 181p. NTIS, PC A09/MF A01. Order Number DE83006469.

This report contains information for 1981 on the cost and quality of fossil fuel receipts to all US electric utility plants with a generating capacity of 25 MW or greater. Plant-by-plant data is grouped by utility in alphabetical order. As compared with 1980, total electric power generation increased 0.4% to 2295 billion kWh. Subdivided by fuel type, coal-fueled generation was 1203 x 10^{9} kWh, up 3.5% and 52.3% of all power generation; nuclear reactors produced 273 x 10^{9} kWh, up 8.8%; and 11.4% of the total; oil produced 206 x 10^{9} kWh, down 16.3%, and 9% of the total; natural gas usage was unchanged and produced 15.1% of the total; and hydro generation at 11.4% of total was down 5.4%. Monthly, state, and regional data are tabulated. (LCL)

20818 **(DOE/EIA--0226(82/01)) Electric power monthly.** (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Jan 1982. 159p. NTIS, PC A08/MF A01. Order Number DE83007733.

The Electric Power Monthly is designed to provide information about electric power production and consumption in a concise format to satisfy the needs of a wide variety of audiences. This publication is geared to applications by electric utilities, industry, consumers, educational institutions, and government in recognition of the growing importance of energy planning in a contemporary society. It presents monthly summaries of electric utility statistics at the national, regional, State, or local levels on the following subjects: fuel stocks; fuel receipts; fuel consumption; net generation; net energy for load; peak load and net capability; cost (fuel receipts); retail prices of electric power; and sales, revenue, and income. Each of these subjects is covered in a separate chapter. Chapters on stocks, receipts, consumption, and net generation present data first for the total US, followed by data summaries at the regional level and the State level. The chapter on sales, revenue, and income of electric utility companies presents US totals, followed by State data. Chapters on net energy for load, and peak load and net capability present US totals first, followed by regional data. The chapter on cost provides national averages followed by State averages, while the chapter on retail prices presents US averages followed by local averages. Each chapter contains related text, tables, or graphs.

20819 **(DOE/EIA--0226(82/03)) Electric Power Monthly.** (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Mar 1982. 157p. NTIS, PC A08/MF A01. Order Number DE83008286.

The Electric Power Monthly is designed to provide information about electric power production and consumption in a concise format to satisfy the needs of a wide variety of audiences. This publication is geared to applications by electric utilities, industry, consumers, educational institutions, and government in recognition of the growing importance of energy planning in a contemporary society. It presents monthly summaries of electric utility statistics at the national, regional, state, or local levels on the following subjects: fuel stocks; fuel receipts; fuel consumption; net generation; net energy for load; peak load and net capability; cost (fuel receipts); retail prices of electric power; and sales, revenue, and income. Each of these subjects is covered in a separate chapter. Chapters on stocks, receipts, consumption, and net generation present data first for the total US, followed by data summaries at the regional level and the state level. The chapter on sales, revenue, and income of electric utility companies present US' totals, followed by regional data. The chapter on cost provides national averages followed by state averages, while the chapter on retail prices presents US' averages followed by local averages. Each chapter contains related text, tables, or graphs.

20820 **(DOE/EIA--0226(82/08)) Electric power monthly.** (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Aug 1982. 102p. NTIS, PC A06/MF A01. Order Number DE83008005.

The Electric Power Monthly is designed to provide information about electric power production and consumption in a concise format to satisfy the need of a wide variety of audiences. This publication is geared to applications by electric utilities, industry, consumers, educational institutions, and government in recognition of the growing importance of energy planning in a contemporary society. It presents monthly summaries of electric utility statistics at the national, regional, state, or local levels on the following subjects: fuel stocks; fuel receipts; fuel consumption; net generation; net energy for load; peak load and net capability; cost (fuel receipts); retail prices of electric power; and sales, revenue, and income. Each of these subjects is covered in a separate chapter. Chapters on stock, receipts, consumption, and net generation present data first for the total US, followed by state data. Chapters on net energy for load, and peak load and net capability present US' totals first, followed by regional data. The chapter on cost provides national averages followed by state averages, while the chapter on retail prices presents US' averages followed by local averages. Each chapter contains related text, tables, or graphs.

20821 **(DOE/EIA--0226(82/09)) Electric Power Monthly.** (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Sep 1982. 108p. NTIS, PC A06/MF A01. Order Number DE83008287.

The Electric Power Monthly is designed to provide information about electric power production and consumption in a concise format to satisfy the needs of a wide variety of audiences. This publication is geared to applications by electric utilities, industry, consumers, educational institutions, and government in recognition of the growing importance of energy planning in a contemporary society. It presents monthly summaries of electric utility statistics at the national, regional, State, or local levels on the following subjects: fuel stocks; fuel receipts; fuel consumption; net generation; net energy for load; peak load and net capability; cost (fuel receipts); retail prices of electric power; and sales, revenue, and income. Each of these subjects is covered in a separate chapter. Chapters on stocks, receipts, consumption, and net generation present data first for the total US, followed by data summaries at the regional level and the State level. The chapter on sales, revenue, and income of electric utility companies presents US totals, followed by State data. Chapters on net energy for load, and peak load, and net capability present US totals first, followed by regional data. The chapter on cost provides national averages followed by State averages, while the chapter on retail prices presents US averages followed by local averages. Each chapter contains related text, tables, or graphs.

20822 **(DOE/EIA—0344) Guide for the assessment of technologies for generating electricity.** (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Jun 1982. 632p. NTIS, PC A99/MF A01. Order Number DE83006468.

This guide provides a general understanding of electric power generation, places each technology in perspective with regard to other technologies, refers the reader to supplementary and more detailed information, and provides a framework for future updating of data bases maintained by EIA. The guide includes information on already commercialized technologies for generating electricity and technologies that have not moved beyond the prototype or demonstration state. It does not, however, include nuclear technologies or cogeneration, and does not discuss the fuel costs associated with producing electricity by each technology.

20823 **(DOE/EIA—0348(81)) Electric Power Annual.** (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Nov 1982. 193p. NTIS, PC A09/MF A01. Order Number DE83008074.

The Electric Power Annual is designed to provide information about electric power production and consumption in a concise format to satisfy the needs of a wide variety of audiences. This publication is geared to applications by electric utilities, industry, consumers, educational institutions, and government in recognition of the growing importance of energy planning in a contemporary society. It presents annual summaries of electric utility statistics at the national, regional, state, or local levels on the following subjects: installed nameplate capacity; fuel stocks; fuel receipts; fuel consumption; net generation; net energy for load; peak load and net capability; cost (fuel receipts); retail prices of electric power; and sales, revenue, and income. Each of these subjects is covered in a separate chapter. Chapters on stocks, receipts, consumption, and net generation present data first for the total US, followed by data summaries at the regional level and the state level. The chapter on sales, revenue, and income of electric utility companies presents US' totals, followed by state data. Chapters on net energy for load, and peak load, and net capability present US' totals first, followed by regional data. The chapter on cost provides national averages followed by state averages followed by state averages, while the chapter on retail prices presents US' average followed by local averages. Each chapter contains related text, tables, or graphs.

20824 **(DOE/PE/70027—T1) Case studies in major bulk-power transactions.** (NPS Energy Management, Inc., Washington, DC (USA)). 1 Sep 1982. Contract AC01-79PE70027. 89p. NTIS, PC A05/MF A01. Order Number DE83006223.

As part of a series of studies examining various aspects of opportunities for deregulating the electric utility industry and for introducing greater competition into bulk power markets, an analysis was made of selected bulk power sales subject to some form of Federal regulation and an attempt was made to determine whether these transactions provide any useful insights into the likely outcomes of similar intersystem transactions in a deregulated environment. This report describes two major bulk power agreements among utilities in the US and two major international bulk power agreements between utility systems in the US and Canada. Questions examined in each of these agreements include the nature of sale; extent of and exercise of FERC jurisdiction; effects of state regulation; extent of required wheeling service; and degree of available competition. The study results show that while deregulation and the resulting competitive pricing might in some instances result in improved efficiency and resource allocation, there are disadvantages to be considered as well. In any event, such deregulation would reduce costs, burdens and delays associated with the regulatory process. Consequently, a number of alternatives are suggested which might lead to improvement in the process of intersystem transaction regulation and some of which might also be considered to be partial deregulation. (LCL)

20825 **(DOE/PE/70027—T3) Financing new electric-generating facilities in deregulated markets: insights from analogous industries.** (NPS Energy Management, Inc., Washington, DC (USA)). 1 Sep 1982. 177p. NTIS, PC A09/MF A01. Order Number DE83006220.

The objective of this study was to assess the terms (if any) under which medium to large scale generating projects could be financed in a deregulated (i.e., competitive) bulk power market. This working paper outlines some of the major considerations needed to address this issue based on experience in other industries and suggests an analytical framework wherein further research can be undertaken.

20826 **(DOE/PE/70106—1) Long-term consumer impacts of electricity-rate regulatory policies.** Navarro, P. (Energy and Environmental Policy Center, Cambridge, MA (USA)). Jan 1983. Contract AM01-79PE70106. 94p. NTIS, PC A05/MF A01. Order Number DE83006590.

Can rate suppressive electric utility regulation raise electricity rates higher than they otherwise would be under more fair and reasonable regulation and thereby make ratepayers worse off. This study examines that hypothesis within the context of several regulatory penalties which rate suppression imposes on the electricity consumer through its distortive effects on the utility's investment and operating decisions and through a risk premium that rate suppression appears to impose on a utility's cost of capital. The sources of rate suppression within the context of state public utility commission (PUC) regulation of the electric utility industry and the PUCs' regulatory mandate are described and analyzed. The effects of rate suppression on an electric utility's investment and operating strategy are examined within the context of the utility's twin responsibilities to ratepayers and shareholders. The three regulatory penalties associated with rate suppression, i.e., fuel penalty, cost of capital penalty, and reliability penalty are discussed. A rate-forecasting methodology to measure the regulatory penalties imposed by rate suppression is developed. A ratemaking model in wide use among the PUCs is used to forecast electricity rates and critical utility financial indicators under the two alternative regulatory regimes (rate-suppression versus capital attraction) for the two alternative investment strategies (capital minimization versus capital optimization). The results of the forecasting analysis provide conclusive evidence that the welfare of electricity ratepayers may be substantially reduced when PUCs adopt policies which prevent a utility from earning its market cost of capital, i.e., when rates are suppressed.

20827 **(DOE/RA/04934—T2) Developer handbook for Section 210 of PURPA for Montana.** Baker, C. (Franklin Pierce Law Center, Concord, NH (USA). Energy Law Inst.). 23 Feb 1982. Contract AC02-78RA04934. 79p. NTIS, PC A05/MF A01. Order Number DE83006780.

The essential element of the Public Utility Regulatory Policies Act of 1978 (PURPA) for developers is a reordering by Congress of the relationship between electric utilities and small power producers. The goal of PURPA is to encourage development of alternative sources of electricity by helping small power production become economically viable. The strategy adopted by Congress for encouraging development has two main components. First, the utility must purchase the power produced by a project meeting certain definitional requirements; and second, the utility must pay a price for the power, determined in accordance with guidelines set out in the FERC regulations. This handbook is designed to explain to developers in Montana the requirements of PURPA, including: who may qualify for treatment as a facility that may invoke the mandates of PURPA; the impact of PURPA on the state; the role of the state utility commission and the impact of state laws on the developer. Thus, the primary goal of the handbook is to provide potential small producers with a working understanding of their status and rights vis a vis the state utility commissions and electric utilities, and to aid the potential developer in obtaining the information needed to stimulate further research and development.

20828 (DOE/RA/04934—T3) Public Utility Commission manual for Section 210 PURPA for New york. (Franklin Pierce Law Center, Concord, NH (USA). Energy Law Inst.). 30 Sep 1982. Contract AC02-78RA04934. 122p. NTIS, PC A06/MF A01. Order Number DE83006702.

The Public Utility Regulatory Policies Act of 1978 (PURPA) places obligations on both electric utilities and state regulatory commissions. PURPA requires every electric utility to purchase all energy and capacity made available to it, by a qualifying facility, and to sell energy and capacity to a qualifying facility upon the qualifying facility's request. State regulatory commissions must implement and administer these utility obligations and other requirements that were implemented by the Federal Energy Regulatory Commission's (FERC) final rules, which became effective March 20, 1981; and must set fair rates for electric power purchases and sales between utilities and small power producers. This manual provides a concise, annotated explanation of the final FERC rules, a description of federal and state statutory authorizations, court challenges to these authorizations, analysis of the relationship between federal and state laws, analysis of New York's implementation of section 210 of PURPA and for comparison, annotations of selected state regulatory authority decisions.

20829 (DOE/RA/04934—T11) Developer handbook for Section 210 of PURPA for Georgia. (Franklin Pierce Law Center, Concord, NH (USA). Energy Law Inst.). 30 Sep 1982. Contract AC02-78RA04934. 65p. NTIS, PC A04/MF A01.

The essential element of the Public Utility Regulatory Policies Act of 1978 (PURPA) for developers is a reordering by Congress of the relationship between electric utilities and small power producers. The goal of PURPA is to encourage development of alternative sources of electricity by helping small power production become economically viable. The strategy adopted by Congress for encouraging development has two main components. First, the utility must purchase the power produced by a project meeting certain definitional requirements; and second, the utility must pay a price for the power, determined in accordance with guidelines set out in the FERC regulations. This handbook is designed to explain to developers in Georgia the requirements of PURPA, including: who may qualify for treatment as a facility that may invoke the mandates of PURPA; the impact of PURPA on the state; the role of the state utility commission and the impact of state laws on the developer. Thus, the primary goal of the handbook is to provide potential small producers with a working understanding of their status and rights vis a vis the state utility commissions and electric utilities, and to aid the potential developer in obtaining the information needed to stimulate further research and development.

20830 (DOE/RA/04934—T12) Developer handbook for Section 210 of PURPA for New Hampshire. Wersan, D.; O'Connell, J. (Franklin Pierce Law Center, Concord, NH (USA). Energy Law Inst.). 4 Sep 1981. Contract AC02-78RA04934. 62p. NTIS, PC A04/MF A01. Order Number DE83006776.

The essential element of the Public Utility Regulatory Policies Act of 1979 (PURPA) for developers is a reordering by Congress of the relationship between electric utilities and small power producers. The goal of PURPA is to encourage development of alternative sources of electricity by helping small power production become economically viable. The strategy adopted by Congress for encouraging development has two main components. First, the utility must purchase the power produced by a project meeting certain definitional requirements; and second, the utility must pay a price for the power, determined in accordance with guidelines set out in the FERC regulations. This handbook is designed to explain to developers in New Hampshire the requirements of PURPA, including: who may qualify for treatment as a facility that may invoke the mandates of PURPA; the impact of PURPA on the state; the role of the state utility commission and the impact of state laws on the developer. Thus, the primary goal of the handbook is to provide potential small producers with a working understanding of their status and rights vis a vis the state utility commissions and electric utilities, and to aid the potential developer in obtaining the information needed to stimulate further research and development.

20831 (DOE/RA/04934—T14) Public Utility Commission manual for Section 210 of PURPA for North Carolina. (Franklin Pierce Law Center, Concord, NH (USA). Energy Law Inst.). 30 Sep 1982. Contract AC02-78RA04934. 113p. NTIS, PC A06/MF A01. Order Number DE83006694.

The Public Utility Regulatory Policies Act of 1978 (PURPA) places obligations on both electric utilities and state regulatory commissions. PURPA requires every electric utility to purchase all energy and capacity made available to it, by a qualifying facility, and to sell energy and capacity to a qualifying facility upon the qualifying facility's request. State regulatory commissions must implement and administer these utility obligations and other requirements that were implemented by the Federal Energy Regulatory Commission's (FERC) final rules, which became effective March 20, 1981; and must set fair rates for electric power purchases and sales between utilities and small power producers. This manual provides a concise, annotated explanation of the final FERC rules, a description of federal and state statutory authorizations, court challenges to these authorizations, analysis of the relationship between federal and state laws, analysis of North Carolina's implementation of section 210 of PURPA and for comparison, annotations of selected state regulatory authority decisions.

20832 (DOE/RA/04934—T16) Public Utility Commission manual for Section 210 of PURPA for Colorado. (Franklin Pierce Law Center, Concord, NH (USA). Energy Law Inst.). 30 Sep 1982. Contract AC02-78RA04934. 109p. NTIS, PC A06/MF A01. Order Number DE83006659.

The Public Utility Regulatory Policies Act of 1978 (PURPA) places obligations on both electric utility to purchase all energy and capacity made available to it, by a qualifying facility, and to sell energy and capacity to a qualifying facility upon the qualifying facility's request. State regulatory commissions must implement and administer these utility obligations and other requirements that were implemented by the Federal Energy Regulatory Commission's (FERC) final rules, which became effective March 20, 1981; and must set fair rates for electric power purchases and sales between utilities and small power producers. This manual provides a concise, annotated explanation of the final FERC rules, a description of federal and state statutory authorizations, court challenges to these authorizations, analysis of the relationship between federal and state laws, analysis of Colorado's implementation of section 210 of PURPA and for comparison, annotations of selected state regulatory authority decisions.

20833 (DOE/RA/04934—T26) Developer handbook for Section 210 of PURPA for Maine. O'Connell, J. (Franklin Pierce Law Center, Concord, NH (USA). Energy Law Inst.). 4 Sep 1981. Contract AC02-78RA04934. 62p. NTIS, PC A04/MF A01. Order Number DE83006781.

The essential element of the Public Utility Regulatory Policies Act of 1978 (PURPA) for developers is a reordering by Congress of the relationship between electric utilities and small power producers. The goal of PURPA is to encourage development of alternative sources of electricity by helping small power production become economically viable. The strategy adopted by Congress for encouraging development has two main components. First, the utility must purchase the power produced by a project meeting certain definitional requirements; and second, the utility must pay a price for the power, determined in accordance with guidelines set out in the FERC regulations. This handbook is designed to explain to developers in Maine the requirements of PURPA, including: who may qualify for treatment as a facility that may invoke the mandates of PURPA; the impact of PURPA on the state; the role of the state utility commission and the impact of state laws on the developer. Thus, the primary goal of the handbook is to provide potential small producers with a working understanding of their status and rights vis a vis the state utility commissions and electric utilities, and to aid the potential developer in obtaining the information needed to stimulate further research and development.

20834 **(DOE/RA/04934—T30) Public Utility Commission manual for Section 210 of PURPA for Montana.** (Franklin Pierce Law Center, Concord, NH (USA). Energy Law Inst.). 30 Sep 1982. Contract AC02-78RA04934. 121p. NTIS, PC A06/MF A01. Order Number DE83006705.

The Public Utility Regulatory Policies Act of 1978 (PURPA) places obligations on both electric utilities and state regulatory commissions. PURPA requires every electric utility to purchase all energy and capacity made available to it, by a qualifying facility, and to sell energy and capacity to a qualifying facility upon the qualifying facility's request. State regulatory commissions must implement and administer these utility obligations and other requirements that were implemented by the Federal Energy Regulatory Commission's (FERC) final rules, which became effective March 20, 1981; and must set fair rates for electric power purchases and sales between utilities and small power producers. This manual provides a concise, annotated explanation of the final FERC rules, a description of federal and state statutory authorizations, court challenges to these authorizations analysis of the relationship between federal and state laws, analysis of Montana's implementation of section 210 of PURPA and for comparison, annotations of selected state regulatory authority decisions.

20835 **(DOE/RA/50236—1) NCSL Small-Scale Hydro Project. Final report, September 1978-January 1983.** (National Conference of State Legislatures, Denver, CO (USA)). 1983. Contract FG03-80RA50236. 37p. NTIS, PC A03/MF A01. Order Number DE83007416.

The principal objective of the National Conference of State Legislatures' (NCSL) Small Scale Hydro Project was to stimulate small-scale hydropower. The project had the following work tasks: to initiate state small-scale hydro policy reviews; provide technical assistance to state small-scale hydro policy reviews; serve as liaison with small-scale hydro community; and perform project evaluation by preparing technical status reports. The activities performed in this project and the technical assistance provided to specified states are enumerated. (LCL)

20836 **(DOE/RG/06380—T1) Electric-utility financial database documentation.** (Temple, Barker and Sloane, Inc., Lexington, MA (USA)). Jul 1979. Contract AC01-78RG06380. 41p. NTIS, PC A03/MF A01. Order Number DE83006021.

This report is intended to describe and document a computerized national electric utility database which contains data for each of the 212 privately owned Class A and B electric utilities which existed at the end of 1976. The database contains both historical and projected financial operating data items which are intended to provide DOE with a sufficient base to make company-specific financial projections for a ten-year period. This report defines and describes each of the data items in the database, and documents the procedures used to derive each item so that the database can be maintained in the future. Data items include: operations and maintenance expenses; exogenous variables; financial parameters; existing electrical plant; initial financial items; and capital budget.

20837 **(EPRI-CS—2860) Continuous-emission monitoring in the electric-utility industry. Final report.** (Kilkelly Environmental Associates, Inc., Raleigh, NC (USA)). Feb 1983. 114p. NTIS, PC A06/MF A01. Order Number DE83901457.

Many electric utility companies are experiencing difficulty and incurring significant costs in attempting to comply with federal and state continuous emission monitoring (CEM) regulations. Electric utility users have found that CEM systems are expensive to operate, require extensive maintenance, are not reliable, and are subject to numerous application-specific problems. In addition, CEM regulations are complex, difficult to interpret, and constantly changing. These difficulties not withstanding, most electric utility companies are either now required or will soon be required to install and operate CEM systems. Therefore, information that may assist prospective users in establishing successful CEM programs was compiled from the results of two utility surveys, a CEM user's workshop, and several site evaluations of CEM installations. From this information, it was determined that the major elements of an effective CEM program include: (1) corporate commitment, (2) thorough understanding of CEM regulations, (3) recognition of the limitations of CEM technology, (4) adequate consideration of application-specific influences, (5) comprehensive maintenance and quality assurance, (6) adequately trained, dedicated personnel, and (7) working rapport with the regulating agency. Incorporation of these elements during the development stage will help minimize the cost and burden of implementing many CEM programs.

20838 **(EPRI-EA—2832) Energy use and customer welfare effects of residential time-of-use rates. Final report.** Parks, R.W. (Parks (Richard W.), Seattle, WA (USA)). Jan 1983. 50p. NTIS, PC A03/MF A01. Order Number DE83901459.

The first part of this study presents an econometric analysis of the consumer response to time-of-use pricing of electricity using data from the Wisconsin Residential Time-Of-Use Electricity Pricing Experiment for July of 1977. We employ a neoclassical consumer choice framework that assumes a two-stage consumer budgeting process. This framework, used also by Caves and Christensen and others in analyzing electricity demand, places emphasis on the estimation of substitution parameters in the context of conditional demand functions. We provide estimates of the elasticities of substitution which indicate how consumers adjust their consumption at various times in response to changes in the relative prices of electricity at these times. We distinguish a peak, off-peak, and two shoulder periods in our analysis. The results confirm for this multiperiod analysis the results of studies that examine only peak versus off-peak use in finding small but statistically significant substitution responses by consumers. The second part of the study considers measures of the welfare consequences for consumers of a shift to time differentiated rates. We show how the special structure of the choice model can be used to permit a simple calculation of a compensating variation measure of the welfare effects, and we present estimates of the measure for the various experimental groups based on the econometric results together with other evidence.

20839 **(EPRI-NP—2875) Information system for generation availability: executive summary. Final report.** Keller, R.W. (TERA Corp., Englewood, CO (USA)). Feb 1983. 23p. NTIS, PC A02/MF A01. Order Number DE83901444.

This report presents a summary of EPRI-sponsored research into the requirements, applications, and design of an Information System for Generation Availability (ISGA). A review of the program's accomplishments is provided, and a guide is included to the available material, the majority of which is in a form that enables direct adaptation and application by individual utilities. EPRI funding and industry support for the ISGA, initiated in 1976, were terminated in 1982.

20840 **(GAO/EMD—82-102) Clear federal-policy guidelines needed for future Canadian-power imports.** (General Accounting Office, Washington, DC (USA). Office of the Comptroller General). 20 Sep 1982. 81p. General Accounting Office, P.O. Box 6015, Gaithersburg, MD 20760.

Report to The Congress.

United States imports of Canadian electricity have been rapidly increasing for the last 10 years and are expected to continue for the next decade. Canadian utilities will have excess capacity equivalent to the output of 10 to 20 large nuclear powerplants available for export through 1996. The Department of Energy exercises control over imports of Canadian electricity by issuing permits for the construction of electrical transmission facilities at international borders. To date such permit applications have been appraised on a case-by-case basis. But anticipated increases in Canadian imports clearly signify the need for clear policy guidelines on the role of Canadian power to guide DOE's permit approval program and as part of its overall electricity planning efforts. GAO recommends that the Secretary of Energy work with the executive subcabinet working group on Regulation, Completition, and Efficiency in the Electric Utility Industry to establish clear Federal policy guidelines towards Canadian power imports

20841 (GAO/EMD—82-125) **Federal Government is still not adequately prepared to respond to major electrical emergencies.** (General Accounting Office, Washington, DC (USA). Energy and Minerals Div.). 13 Sep 1982. 23p. General Accounting Office, P.O. Box 6015, Gaithersburg, MD 20760.

Report to The Chairman, House Subcommittee on Energy, Environment, and Safety Issues Affecting Small Business.

In a previous review GAO found Federal electrical-emergency-preparedness programs and plans to be deficient. After a year, very little substantive progress has been made at preparing the United States to respond to a national or regional disruption. While the Department of Energy and the Federal Emergency Management Agency have taken a few positive steps, Federal electrical-emergency-preparedness programs and plans have not been developed. Without a strong Federal role in electrical emergency preparedness, it may be difficult to manage and restore electrical power if a major disruption occurred because States will not be able to deal with such an incident in an effective and timely manner. To be prepared, GAO believes the Department of Energy and the Federal Emergency Management Agency should implement its previous recommendations.

20842 (ITA—82-08-503) **Survey of the Italian market on electric power systems and energy conservation equipment. Foreign market survey report.** (J.B.A., Milan (Italy)). Jan 1982. 67p. NTIS PC $15.00/MF A01.

The market research was undertaken to study the present and potential US share of the market in Italy for electric power systems and energy conservation equipment; to examine growth trends in Italy end-user industries over the next few years; to identify specific product categories that offer the most promising export potential for US companies; and to provide basic data which will assist US suppliers in determining current and potential sales and marketing opportunities. The trade promotional and marketing techniques which are likely to succeed in Italian were also reviewed.

20843 (ITA—82-08-507) **A brief market study on electric power systems and energy conservation equipment in Thailand. Foreign market survey report (final).** (Applied Research Corp., Singapore). Mar 1982. 72p. NTIS PC $15.00/MF A01.

The market research was undertaken to study the present and potential US share of the market in Thailand for electric power systems and energy conservation equipment; to examine growth trends in Thai end-user industries over the next few years; to identify specific product categories that offer the most promising export potential for US companies; and to provide basic data which will assist US suppliers in determining current and potential sales and marketing opportunities. The trade promotional and marketing techniques which are likely to succeed in Thailand were also reviewed.

20844 (ITA—82-08-516) **The market for power generation equipment in Turkey (1982-1986). Foreign market survey report.** Gur, E.Y. (American Embassy, Ankara (Turkey)). Mar 1982. 49p. NTIS PC $15.00/MF A01.

The market research was undertaken to study the present and potential US share of the market in Turkey for power generation equipment; to examine growth trends in Turkish end-user industries over the next few years; to identify specific product categories that offer the most promising export potential for US companies; and to provide basic data which will assist US suppliers in determining current and potential sales and marketing opportunities. The trade promotional and marketing techniques which are likely to succeed in Turkey were also reviewed.

20845 (NP—3900143) **Energy supplies and energy conservation. Pt.2.** (Badenwerk A.G., Karlsruhe (Germany, F.R.)). 1982. 53p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83900143.

A description of the structure and the activities of this power utility company is given which had also served as an information basis for the general meeting held on the 25th of June 1982. Furthermore, explanations on the annual accounting of 1981 are given and the report of the supervisory board is presented. The annual balance as well as the profit and loss account are given in the appendix.

20846 (NP—3901023) **Electric power supply in the Federal Republic of Germany - August 1981.** (Bundesministerium fuer Wirtschaft, Bonn (Germany, F.R.)). 1981. 3p. (In German). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83901023.

Tables and diagrams are presented for the month under report with figures on electric power generation (water, heat), exchange with other countries and the GDR, industrial power generation, power consumption, power generation on the third Wednesday of the month, consumption and stock of coal in utility-owned power plants and development of power consumption from the public supply network.

20847 (NP—3901024) **Electric power supply in the Federal Republic of Germany - February 1982.** (Bundesministerium fuer Wirtschaft, Bonn (Germany, F.R.)). 1982. 4p. (In German). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83901024.

Tables and diagrams are presented for the month under report with figures on electric power generation (water, heat), exchange with other countries and the GDR, industrial power generation, power consumption, power generation on the third Wednesday of the month, consumption and stock of coal in utility-owned power plants and development of power consumption from the public supply network.

20848 (NP—3901025) **Electric power supply in the Federal Republic of Germany in the year 1981.** (Bundesministerium fuer Wirtschaft, Bonn (Germany, F.R.)). 1981. 4p. (In German). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83901025.

Tables and diagrams are presented for the year under report with figures on electric power generation (water, heat), exchange with other countries and the GDR, industrial power generation, power consumption, power generation on the 3rd Wednesday in December, consumption and stocks of coal in utility-owned power plants and the development of power consumption from public supply network.

20849 (NP—3901666) **Reserve-reliability analysis study module V. Final report.** (ICF, Inc., Washington, DC (USA)). Aug 1982. 63p. NTIS, PC A04/MF A01. Order Number DE83901666.

Customer costs of electrical energy shortfalls (i.e., customer outage costs) by major customer class categories, as a function of increasing levels of curtailments were estimated for residential, commercial and industrial sectors. The total regional outage cost as a function of increasing levels of curtailments, and under alternate curtailment strategies was forecasted. A strategic planning model was developed to analyze issues related to strategic resource planning: identification of least cost investment strategies under uncertain load growth which rely on the economically optimal level of demand-side and renewable resource options in addition to traditional supply-side options; reserve-reliability tradeoff (i.e., the optimal level of power supply reliability); and impact of a less conservative planning philosophy vis-a-vis the assumption of critical water planning.

20850 (NP—3901667) **User's manual for the bill comparison and usage modification programs. Rate-design analysis study module IV. Technical appendix to final report.** (ICF, Inc., Washington, DC (USA)). Aug 1982. 50p. NTIS, PC A03/MF A01. Order Number DE83901667.

This manual describes the use and applications of two FORTRAN programs. This bill comparison program calculates electric bills for specified consumption levels under two sets of rates and then compares them on monthly, seasonal and annual bases. The usage modification program uses price elasticities to estimate the effects on consumption of a new set of rates. After the new consumption levels are calculated, electricity bills under the new rates are calculated on both a monthly and annual basis. The manual is organized in three sections. Section II describes the output tables which are produced along with a listing of the input files needed to run the programs. Section III provides a detailed line-by-line discussion of the entries for the input files. Three appendices are used to provide listings of the programs, including the program used to generate the transfer tape.

20851 (NP—3901668) **Rate design analysis study module IV. Final report, Phase II.** (ICF, Inc., Washington, DC (USA)). Aug 1982. 98p. NTIS, PC A05/MF A01. Order Number DE83901668.

Rate design alternatives were reviewed to encourage cost-effective conservation and renewable resources within the Pacific Northwest region. An analytic framework was developed for evaluating the rate design alternatives. Recommendations are given concerning relevant rate designs and their impacts. Policy options are suggested for implementing the findings.

20852 (ORNL/TM—8510) **Age and capacity profile of electric-generation plants in the United States.** Hudson, C.R. II. (Oak Ridge National Lab., TN (USA)). Mar 1983. Contract W-7405-ENG-26. 40p. NTIS, PC A03/MF A01. Order Number DE83008169.

There are currently over 9000 power plants in the United States of varying types and ages. This study categorizes these plants by age, fuel type, and region. In addition, capacity trends through time and potential replacement-capacity needs are addressed.

20853 (P—110-82-003) **Delivering energy services: new challenges for California's electric utilities.** Praul, C.G.; Marcus, W.B.; Dawson, M.H. (California Energy Resources Conservation and Development Commission, Sacramento (USA)). Mar 1982. 364p. California Energy Commission, 1516 Ninth Street, Sacramento, CA.

The purpose of this paper is to explore the financial circumstance and energ service corporation opportunities of California's investor-owned and municipal electric or electric/gas utilities. Background information is provided on the national utility context and the current financial status of the state's major investor-owned electric, electric/gas utilities. Two utility finance/electricity supply strategies for the 1980s are reviewed California and national programs requiring increased utility energy service capabilities are discussed. Concerns and recommendations regarding utility transformation toward broader energy service roles are presented.

20854 **Sample design considerations and sample selection for the Vermont time-of-day electricity use survey.** Hausman, J.A. (Massachusetts Inst. of Tech.); Trimble, J.L. pp 83-96 of Review of public data use 9. New York, NY; Elsevier North Holland (1981).

This article presents a sample selection procedure that separates two potentially serious forms of sample bias. It also reviews the sample selection procedure in a mail survey of residential electricity users in the state of Vermont. The survey was designed to provide evidence, for policy purposes, of the potential long-range effects of a new rate structure for residential users - the time-of-day (TOD) rate, for which changes depend on what period of day electricity is consumed. Adjustments to TOD rates are of national policy interest. Vermont is one of but a few areas for which real evidence of the long-term effect of TOD rates is available. The design strategy for examining long-range effects is to allow for the comparison of electricity-using durable good purchases and energy-saving capital expenditures between two groups of residential customers - one under the TOD rate and the other not.

2980 Consumption And Utilization

REFER ALSO TO CITATION(S) 19647, 19648, 19649, 19699, 20761, 20776, 20789, 20809, 20945, 20947

20855 (DOE/EIA—0035(82/05)) **Monthly Energy Review.** (Department of Energy, Washington, DC (USA). Energy Information Administration). May 1982. 105p. NTIS, PC A06/MF A01. Order Number DE83008093.

Current data and trends are presented for production, consumption, stocks, imports, exports, and prices for the principal energy commodities in the United States. Also included are data on internaional production of crude oil, consumption of petroleum products, petroleum stocks, and production of electricity from nuclear powered facilities. Energy production during the first 2 months of 1982 totaled 10.7 quadrillion Btu, virtually unchanged from the level of production during the same period of 1981. Energy consumption during the first 2 months of 1982 totaled 13.5 quadrillion Btu, a 1.6% decrease compared to consumption during the same period of 1981. Net imports of energy during the first 2 months of 1982 totaled 1.2 quadrillion Btu, 38.0% below the level of the first 2 months of 1981.

20856 (DOE/EIA—0035(82/06)) **Monthly Energy Review.** (Department of Energy, Washington, DC (USA). Energy Information Administration). Jun 1982. 103p. NTIS, PC A06/MF A01. Order Number DE83007964.

Current data and trends are presented for production, consumption, stocks, imports, exports, and prices for the principal energy commodities in the United States. Also included are data on international production of crude oil, consumption of petroleum products, petroleum stocks, and production of electricity from nuclear powered facilities. Energy production during the first 3 months of 1982 totaled 16.7 quadrillion Btu, a 1.5% increase compared to the level of production during the same period of 1981. Energy consumption during the first 3 months of 1982 totaled 19.9 quadrillion Btu, a 0.9% decrease compared to consumption during the same period of 1981. Net imports of energy during the first 3 months of 1982 totaled 1.7 quadrillion Btu, 39.3% below the level of the first 3 months of 1981.

20857 (DOE/EIA—0035(82/07)) **Monthly energy review.** (Department of Energy, Washington, DC (USA). Energy Information Administration). Jul 1982. 105p. NTIS, PC A06/MF A01. Order Number DE83008091.

Current data and trends are presented for production, consumption, stocks, imports, exports, and prices for the principal energy commodities in the United States. Also included are data on international production of crude oil, consumption of petroleum products, petroleum stocks, and production of electricity from nuclear powered facilities. Energy production during the first 4 months of 1982 totaled 22.2 quadrillion Btu, a 5.0-percent increase compared to the level of production during the same period of 1981. Natural gas production decreased by 2.4 percent. Increases in production occurred for petroleum and coal. Petroleum production was up by 0.2 percent and coal production was up by 15.9 percent. All other forms of energy production combined were up by 15.5 percent. Energy consumption during the first 4 months of 1982 totaled 25.8 quadrillion Btu, a 0.3-percent decrease compared to the level of consumption during the same period of 1981. Net imports of energy during the first 4 months of 1982 totaled 2.1 quadrillion Btu, 40.7 percent below the level of the first 4 months of 1981.

20858 (DOE/EIA—0035(82/09)) **Monthly energy review. First half 1982 summary.** (Department of Energy, Washington, DC (USA). Energy Information Administration). Sep 1982. 108p. NTIS, PC A06/MF A01. Order Number DE83008090.

The report presents current data and trends for production, consumption, stocks, imports, exports, and prices for the principal energy commodities in the United States. Also included are data on international production of crude oil, consumption of petroleum products, petroleum stocks, and production of electricity from nuclear powered facilities. This issue contains energy summary data for the first 6 months of 1982. Electricity sales during this period declined 1.1 percent from the level for the first half of 1981. Because domestic energy consumption was lower and energy production was higher than during the first half of 1981, lower levels of energy imports were sufficient to meet the Nation's energy requirements. Refiner acquisition costs of crude oil and prices of petroleum products were lower than in the first 6 months of the previous year. Supplies of natural gas and coal were larger at the end of June 1982 than at the end of June a year earlier.

20859 **(DOE/EIA—0035(82/11)) Monthly energy review.** (USDOE Energy Information Administration, Washington, DC. Office of Energy Markets and End Use). Nov 1982. 104p. NTIS, PC A06/MF A01. Order Number DE83008012.

Current data are presented for production, consumption, stocks, imports, exports, and prices for the principal energy commodities in the United States. Also included are data on international production of crude oil, consumption of petroleum products, petroleum stocks, and production of electricity from nuclear powered facilities. Energy production during the first 8 months of 1982 totaled 43.4 quadrillion Btu, a 2.1 percent increase compared to the level of production during the same period of 1981. Energy consumption during the first 8 months of 1982 totaled 48.0 quadrillion Btu, a 3.2-percent decrease compared to consumption during the same period of 1981. Net imports of energy during the first 8 months of 1982 totaled 4.7 quadrillion Btu, 30.1 percent below the level of the first 8 months of 1981.

20860 **(DOE/EIA—0321/1) Residential energy consumption survey: consumption and expenditures, April 1980-March 1981. Part 1. National data.** (USDOE Energy Information Administration, Washington, DC. Office of Energy Markets and End Use). Sep 1982. 248p. NTIS, PC A11/MF A01. Order Number DE83008001.

This report covers consumption for the period April 1980 through March 1981. It contains detailed tabulations of total consumption and expenditures and of consumption and expenditures per household for all fuels and for specific fuels. These data are given by significant energy-related characteristics of the household. Energy use by the measured area of the house is also included. This report also contains results of an effort to measure consumption of wood fuels.

20861 **(DOE/EIA—0358) Report on the 1980 manufacturing industries energy consumption study and survey of large combustors.** (USDOE Energy Information Administration, Washington, DC. Office of Energy Markets and End Use). Jan 1983. 60p. NTIS, PC A04/MF A01. Order Number DE83008811.

An overview of data collected from a 1980 Manufacturing Industries Energy Consumption Study and Survey of Large Combustors was designed to collect information on large combustors in the United States and the manufacturing establishments operating them. The survey was mailed to a list of respondents in late November and early December 1980. Although responses were received from approximately 76%, the usefulness of the survey was substantially diminished for the following reasons: the results of this survey are probably somewhat biased due to systematic nonresponse error; and because of the withdrawal of authority for this survey, the EIA was unable to undertake a followup of respondents to resolve problems of missing and seemingly questionable data.

20862 **(NP—3900027) Energy supplies and energy conservation. Pt. 2.** Gruenhagen, J. (Deutsche Presse-Agentur G.m.b.H., Hamburg (Germany, F.R.)). 17 Feb 1981. 17p. (In German). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83900027.

This second part of the documentation gives a short survey of the utilization of conventional energy carriers and of alternative energy conversion methods (cogeneration, heat pumps, solar energy, bioenergy, wind and water power).

2990 Unconventional Sources And Power Generation

REFER ALSO TO CITATION(S) 19931, 19965, 19965, 19976, 19983, 19984, 19985, 19987, 20013, 20015, 20016, 20021, 20036, 20038, 20074, 20075, 20077, 20164, 20191, 20205, 20208, 20862, 20895, 20900, 20999, 21002

20863 **(DOE/EIA—0360(80)) 1980 Active-Solar Installations Survey.** (Applied Management Sciences, Inc., Silver Spring, MD (USA)). Oct 1982. Contract AC01-80EI10231. 57p. NTIS, PC A04/MF A01. Order Number DE83008026.

The survey covers active solar installations made during and prior to calendar year 1980. As the first survey of active solar installations in the United States, the objective was to establish a national baseline information system that could provide current data on residential and commercial active solar installations as well as a listing of firms involved in the active solar industry, including installers. Potential respondents were identified from regional lists of solar equipment dealers and installers compiled by each Regional Solar Energy Center (RSEC). The RSEC lists were computerized and combined into a mailing list of 5466 company names and addresses. An additional 1619 referrals, were provided by survey respondents from the RSEC list. However, because of resource constraints, 981 of these referrals were not included in the survey. To substantiate that the results of this survey represent accurate statistics on the number of active solar installations in the United States, a comparison was made to the Solar Collector Manufacturing Survey installations. (PSB)

20864 **(EUR—7597-EN/Vol.1) Present state of technology of recovery and conversion process for synthetic fuels.** Caemmerer, D.; Niclauss, M.; Schinke, H. (Commission of the European Communities, Luxembourg). 1982. 20p. Available from the Commission of the European Communities, Luxembourg.

The production of synthetic fuels, as alternative to the use of crude oil, is technologically possible by different ways and means. Since the 1920's the greatest attention has been paid to the raw materials with a fossil base such as hard coal, lignite, shale oil and tar sands. For the extraction and conversion of such deposits large-scale plants with relatively low investment and running costs are needed. It is necessary to widen the range of energy bases as the conventional primary energy bases such as crude oil, natural gas and coal are growing scarce, more expensive, and might become unavailable for political reasons. One alternative is the use of solar energy, either from solar collectors and photocells or indirectly from biomass. Therefore the production of synthetic fuels from biomass is considered with particular care in the presented study. The analysis introduces the various sources of synthetic fuels and deals with all important aspects related to the recovery and conversion processes for synthetic fuels, like technology, apparatus and pollution, economy and market structure and also certain political developments which might become decisive. Finally some recommendations are made for directions of future advanced developments. These recommendations cover however technological points of view only.

20865 **(LBL—14782-Rev.) Methods for evaluating the DOE Appropriate-Technology Program: A review and compilation of evaluation methods.** Lucarelli, B. (Lawrence Berkeley Lab., CA (USA)). Jul 1982. Contract AC03-76SF00098. 92p. NTIS, PC A05/MF A01. Order Number DE83007165.

Procedures are described for evaluating the energy impact of renewable energy resource projects. Four recommendations are made: to establish a common set of guidelines for evaluating the energy impact of federal energy grant programs; use a simplified evaluation approach in the interim until the guidelines are set; develop additional project evaluation methods; and analyze the non-energy impacts of the Appropriate Technology Program. Previously used evaluation approaches are discussed as regards energy impact definition, sample selection, project evaluation, and program impact analysis. Methods are described for determining direct energy impacts of: wind electric, hydroelectric, anaerobic digestion (biomass); solar water heating and space heating; passive solar; weatherization/conservation; and geothermal space and water heating technologies. The methodology for estimating the cost-effectiveness of an energy system is presented. Tables of load collector ratios and solar savings fraction for different passive systems are supplied.

30 DIRECT ENERGY CONVERSION

3001 Mhd Generators

REFER ALSO TO CITATION(S) 22764

20866 (CONF-800151—2) Three-dimensional analysis of MHD generators: development of electrical solution. Ahluwalia, R.K.; Vanka, S.P.; Im, K.H.; Zwick, S.A. (Argonne National Lab., IL (USA)). 1980. Contract W-31-109-ENG-38. 11p. NTIS, PC A02/MF A01. Order Number DE83007599.

From Aerospace sciences meeting; St Louis, MO, USA (12 Jan 1980).

A model for calculating three-dimensional current and electric-field distributions in MHD generator channels is formulated and numerically solved. The chief advantage of this model is that its solution can be implemented on the digital computer in less than one CPU second and thus the model can be conveniently coupled to a full three-dimensional gas-dynamic analysis. The model is equally valid for Faraday, diagonal insulating-side-wall, and diagonal conducting-sidewall channels. Accuracy of the model is calibrated by compring its predictions with the results of three-dimensional finite segmentation analyses. The model is found to perform best for channels with low wall temperatures and low electrode pitch-to-height ratios, and when the boundary layers are thick. A discussion is given of the roles of the nonuniformity in normal current density, as predicted by the model, leading to velocity overshoots in the boundary layers, and of the transverse nonuniformity in Hall current density, generating secondary flows.

20867 (CONF-810614—7) Radiative transfer in spectrally-dissimilar absorbing-emitting-scattering adjacent mediums. Im, K.H.; Ahluwalia, R.K. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 10p. NTIS, PC A02/MF A01. Order Number DE83007650.

From 16. thermophysics conference; Palo Alto, CA, USA (23 Jun 1981).

Structure of radiation field in a cylindrical medium having two regions of different, but uniform absorption and scattering coefficients is analyzed. Fundamental aspects of the problem are elucidated by considering the case of a gray medium. It is shown for example that for unequal absorption coefficients in the two regions, both emission and absorption rates are discontinuous at the interface of the two regions, but the heat flux and incident radiation are continuous. As an application of the analysis, the influence on heat transfer of spatial distribution of particles in a coal-burning swirl combustor is investigated. In the example application, spectral calculations are performed spanning over the broad frequency range of the thermal radiation spectrum.

20868 (CONF-810639—6) Secondary-flow effects in diagonal MHD channels. Ahluwalia, R.K.; Vanka, S.P. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 10p. NTIS, PC A02/MF A01. Order Number DE83007934.

From 19. symposium on the engineering aspects of magnetohydrodynamics; Tullahoma, TN, USA (15 Jun 1981).

Detailed three-dimensional calculations are made to study the generation of secondary flows in conducting and insulating-sidewall diagonal channels. The secondary flows are found to have considerable influence on the velocity overshoots, momentum and thermal mixing, flow asymmetry, and the power output. They tend to diminish the velocity overshoots, to promote mixing, and to introduce flow asymmetry. The gross predictions of the three-dimensional model are compared with the experimental data taken at the University of Tennessee Space Research Institute and found to be in good agreement.

20869 (CONF-810664—3) Coupled three-dimensional flow and electrical calculations for Faraday MHD generators. Vanka, S.P.; Ahluwalia, R.K. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 11p. NTIS, PC A02/MF A01 . Order Number DE83007656.

From 5. AIAA computational fluid dynamics conference; Palo Alto, CA, USA (22 Jun 1981).

A three-dimensional model incorporating fully the interaction between the flow and electrical fields in MHD channels is presented. The model consists of Navier-Stokes equations in parabolic form, Maxwell and Ohm's equations as they apply to the MHD situation, and a two-equation turbulence model. The model predictions are first compared against the supersonic flow experimental data from the AEDC facility; these data reflect weak MHD interaction in that the flow field is little affected by the electrical-power extraction. The model is then applied to high-interaction subsonic flow in the AEDC channel to show the emergence of velocity overshoots, secondary flow, and the asymmetries in flow and electrical fields.

20870 (CONF-810812—47) Retrofit of a coal-fired open-cycle liquid-metal MHD to steam power plants. Pierson, E.S.; Herman, H.; Petrick, M.; Grammel, S.J.; Dubey, G. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 7p. NTIS, PC A02/MF A01. Order Number DE83007874.

From IECEC conference; Atlanta, GA, USA (9 Aug 1981).

The application of the new, coal-fired open-cycle liquid-metal MHD (OC-LMMHD) energy-conversion system to the retrofit of an existing, oil- or gas-fired conventional steam power plant is evaluated. The criteria used to evaluate the retrofit are the net plant efficiency and the cost benefit relative to other options, i.e., continuing to burn oil, a conventional retrofit to burn coal (if possible), and an over-the-fence gasifier for boilers that cannot burn coal directly. The efficiency and cost calculations are based on a specific existing steam plant, and a detailed description of the retrofit plant. The unique capability of the OC-LMMHD cycle to control the pollutants normally associated with burning coal is discussed.

20871 (CONF-820645—5) Nucleation of slag and seed in MHD plants. Im, K.H.; Ahluwalia, R.K. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 9p. NTIS, PC A02/MF A01. Order Number DE83007622.

From 20. symposium on engineering aspects of magnetohydrodynamics; Los Angeles, CA, USA (14 Jun 1982).

Evolution of slag and K_2SO_4 particles from the parent vapors in the MHD plant is analyzed by considering the processes of homogeneous nucleation, heterogeneous nucleation and agglomeration of particles in conjunction with gas phase equilibrium chemistry. The nucleation characteristics of the two species are found to be different primarily because of the heavier molecular weight and lower condensation temperature of K_2SO_4. Calculations indicate that in the presence of nucleated slag particles, K_2SO_4 is more likely to condense on the slag particles than to self-nucleate even at moderate slag loadings and rapid quenching of gas. In the downstream components where the gas residence time is comparatively long, agglomeration is seen to cause significant narrowing of the slag particle size spectrum by coagulating the small particles with the larger ones, to reduce the number density of slag particles by an order of magnitude, and to increase the average size of the particles. In the absence of slag particles, the predicted K_2SO_4 particle size spectrum is sensitive to the reduction in surface tension due to droplet curvature.

20872 (CONF-820645—6) Flow-field development in MHD diffusers. Vanka, S.P.; Ahluwalia, R.K. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 10p. NTIS, PC A02/MF A01. Order Number DE83007597.

From 20. symposium on engineering aspects of magnetohydrodynamics; Los Angeles, CA, USA (14 Jun 1982).

The development of the flow field in diffusers for the MHD power generation system is analyzed. The equations governing the flow processes are solved by a numberical procedure in which the inlet conditions are appropriate to the exit conditions of an MHD channel. The development of velocity distortions and secondary flows are investigated for a number of diffuser angles with either side-wall or electrode-wall divergence. For all the cases considered, it is found that the flow separation always occurs at the corner regions of the top wall. The influences of secondary flows and turbulent viscosity are demonstrated.

20873 (CONF-820645—7) Aerosol and vapor deposition of slag and seed in MHD components. Ahluwalia, R.K.; Im, K.H. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 13p. NTIS, PC A02/MF A01. Order Number DE83007619.

From 20. symposium on engineering aspects of magnetohydrodynamics; Los Angeles, CA, USA (14 Jun 1982).

Consistent models are formulated for determining the deposition of slag and seed particles in the components of the MHD plant by the mechanism of thermophoresis, Brownian diffusion, turbulence and inertial impingement. The predictions from the deposition models are compared favorably with the experimental data. The formulated models are found to be significant improvements of the existing deposition theories. A fouling theory is developed that can be used for interpreting, correlating and extrapolating the experimental data. The premise of the fouling theory is confirmed through comparison with the experimental data. The deposition model is incorporated into the population balance equation containing other terms to account for homogeneous nucleation, direct condensation and agglomeration of particles. The complete model is used to study the condensation and deposition of slag and seed in the downstream components of the MHD plant.

20874 (CONF-8111106—1) Integration of open-cycle MHD with various chemical and metallurgical processes. Jones, M.S. Jr. (Ebasco Services, Inc., Newport Beach, CA (USA)). 1981. 22p. Ebasco Services, Inc., Newport Beach, CA.

From Specialists meeting on coal fired MHD power generation; Sydney, Australia (4 Nov 1981).

The use of open-cycle MHD in a cogeneration mode is examined for the electrochemical and metallurgical industries. The MHD cycle has the potential for supplying electricity, steam, and high-temperature air or high-temperature combustion products to meet process requirements. The potential energy savings which may be realized through the use of open-cycle MHD in a cogeneration mode are estimated through the use of a first-order thermodynamic MHD plant model which estimates the amount of fuel required for unit of product as the performance of various plant components are changed. Inputs to the model are the process requirements for electricity, steam, and high-temperature heat. The primary method of analysis is to assume the process requirements for the various industries and to examine how the amount of fuel required varies as the MHD generator enthalpy extraction efficiency is varied. Processes using open-cycle MHD for producing aluminum and chlorine-caustic soda are examined in some detail. Processes for the production of iron or steel, and for the production of hydrogen for ammonia are also examined. The use of open-cycle MHD to produce hydrogen for the manufacture of ammonia is also examined. The use of the high-temperature waste heat in the MHD-channel exhaust for thermochemical hydrogen production in a hybrid cycle is an attractive option. The sizes of possible open-cycle MHD installations for these industries are examined and the conditions that the processes impose on the MHD system are discussed. The suitability of the disc MHD generator for these applications is then examined.

20875 (DOE/ET/15611—T7) Effects of core nonuniformities on the performance of MHD generators. HTGL report No. 234. Wynn, M.C. (Stanford Univ., CA (USA). High Temperature Gasdynamics Lab.). Sep 1982. Contract AC01-80ET15611. 240p. NTIS, PC A11/MF A01. Order Number DE83007901.

The effects on MHD-generator performance of nonuniform temperature and electrical-conductivity distributions in the core of a combustion plasma were investigated. Experiments were performed in which the plasma temperature field in a laboratory-scale MHD channel was perturbed by injection of room-temperature nitrogen. Agreement o the data was obtained with a model developed by extending existing, simple one-dimensional theory. The model was applied to a pilot-plant scale channel and a significant decrease in power production was predicted as a result of nonuniform core properties originating in combustor components. In the experimental portion of the study, room-temperature nitrogen was introduced into an ethanol-oxygen combustion plasma in the wake of an injection apparatus upstream of the channel-active section. Measurements were made of Faraday voltages and currents, as well as plasma-voltage distribution. Temperature profiles were measured at the downstream end of the channel-active section using an optical-resonance line-refersal technique. An electrical model was developed which extended the exact averaged Ohm's Law for strictly 1-D nonuniformities to include the case of property variations strong in a preferred direction. Evolution of the temperature perturbatjion was modeled as the solution to the turbulent convective-diffusion equation. When overall heat balance and temperature-profile data were used to determine local property distributions, the quasi-2D model predictions agreed with plasma-impedance measurements over a range of Hall papameter and nitrogen-injection mass-flow rate.

20876 (DOE/ET/15611—T8) Suppression of turbulence in combustion-driven magnetohydrodynamic flows. Reis, J.C. (Stanford Univ., CA (USA). High Temperature Gasdynamics Lab.). Jan 1983. Contract AC01-80ET15611. 192p. NTIS, PC A09/MF A01. Order Number DE83007902.

Thesis.

The influence of a transverse magnetic field on velocity fluctuations in a combustion-driven magnetohydrodynamic (MHD) flow has been experimentally and theoretically investigated and compared to that in liquid metal MHD flows. The measurements were made with a laser Doppler velocimeter in the Stanford M-2 MHD facility. A comparison of the measured mean velocity profiles, with and without magnetic field, indicated only a slight trend toward a more laminar shape, and substantially less change than in liquid metal flows. The turbulence intensity profiles indicated the same degree of suppression in the core, but substantially less suppression in the boundary layers in comparison to liquid metal flows. The difference is attributed to a reduced electrical conductivity in the boundary layer of the combustion-driven flows. A second difference between combustion-driven and liquid metal MHD flows is that the combustion generated turbulence was dominated by long streamers. A theoretical model for turbulence suppression of the combustion streamers was developed. It was shown that for the magnetic field to affect the flow, a gradient in the velocity in the direction parallel to the magnetic field is required, and that without such a gradient, there would be no effect, even with gradients in the density and conductivity. It was seen that turbulence suppression can be considered to be a local Hartmann effect acting between two adjacent fluid eddies. In computing the effects of turbulence suppression in combustion-driven MHD flows, it is recommended to use the models proposed for liquid metal flows, but with the local electrical conductivity.

20877 (DOE/NASA/3249—1) Vaporization thermodynamics of K_2S and K_2SO_3. Bennett, J.E. (Arkansas State Univ., State University (USA). Dept. of Chemistry). Jun 1982. Contract AI01-77ET10769. 64p. (NASA/CR—168080). NTIS, PC A04/MF A01. Order Number DE83008279.

The vaporization reactions, vapor pressures, and thermodynamics of potassium sulfide and potassium sulfite were studied for purposes of providing fundamental data for the seed-cycle in magnetohydrodynamic electric power generation. Rate-of-effusion studies, supported by tube furnace experiments, x-ray powder diffraction, mass spectrometry and apporpriate chemical analyses and tests, revealed that potassium sulfite disproportionates at high temperatures to form potassium sulfide and potassium sulfate. Potassium sulfide was observed to vaporize incongruently, the initial vapors being predominantly potassium atoms, with minor species being S_2 and various K-S molecules. The ratio of K/S_2 in the vapor is very large initially and decreases steadily with prolonged heating. Several materials were evaluated for purposes of containing K_2S/K_2SO_3 at temperatures $\geqq$ 800°C: Pt, Mo, W, Quartz, machinable glass, BN, high density graphite, pyrolytic-coated graphite, and alumina. Of these, only alumina was observed to be chemically inert to both K_2S but reacted with K_2SO_3. The other materials were not suitable for either substance. Thermodynamic calculations based on measured vapor pressures and approximate free energy functions are described. Results from isothermal total mass loss experiments and from thermogravimetric experiments are also included.

20878 (DOE/NBM—3008205) Design of heat-recovery and seed-recovery units in MHD power generation. Bergman, P.D.; Joubert, J.I.; Demski, R.J.; Bienstock, D. (Bureau of Mines, Pittsburgh, PA (USA). Energy Research Center). 1974. 21p. NTIS, PC A02/MF A01. Order Number DE83008205.

Crucial and limiting engineering and materials problems associated with the design of an MHD steam bottoming plant are discussed. Existing experimental and theoretical results on corrosion, fouling and deposits, potassium seed recovery and regeneration, are reviewed. The state of knowledge regarding the design of heat recovery and seed recovery units for coal-fired MHD plants is inadequate at the present time.

20879 **(DOE/NBM—3008229) MHD combustor designs and materials of construction.** Henry, J.M.; Kurtzrock, R.C.; Bienstock, D. (Bureau of Mines, Pittsburgh, PA (USA). Energy Research Center). 1974. 20p. NTIS, PC A02/MF A01. Order Number DE83008229.

This paper reviews various coal combustor designs for MHD applications and describes the conditions which the materials of construction must withstand. The effect of each of the following variables on MHD combustors is discussed: fuel type, air/fuel ratio, oxygen enrichment, and seed addition. The combustor designs are divided into two broad categories - single-stage combustion and multi-stage combustion.

20880 **(LOG-E—763) Axial field limitations in MHD generators. Part 2: Analytical investigation and comparison with experiments.** Unkel, W.; Kruger, C.H. (Stanford Univ., CA (USA)). Jan 1981. 32p. NTIS, PC A03/MF A01.

REFS Backup document for AIAA Synoptic. Analytical Investigation of Axial Field Limitations in MHD Generators", scheduled for publication in Journal of Energy in Jan. - Feb. 1983.

A detailed fluid and electrical model was developed and used to predict the prebreakdown and incipient breakdown characteristics for a simplified configuration. The model shows that an electro-thermal instability, in either the plasma or the interelectrode insulator, was responsible for the breakdown. The predicted values of the threshold voltage, below which breakdown would not occur, were comparable to the experimental values. Detailed comparison of theory and experiment, however, indicates only moderately good agreement, even for the relatively sophisticated model used. Nevertheless, the model can be used to predict the trends of threshold voltage with the channel parameters. Breakdown modeling of the full generator configuration was limited to a coarse electrical solution to simulate the effect of single or multiple breakdowns on the behavior of the surrounding gaps. Moderate success was achieved with the model.

20881 **(NASA-CR—165053) Conceptual design of superconducting magnet system for magnetohydrodynamic (MHD) Engineering Test Facility (ETF) 200 MWE power plant. Final report.** (Massachusetts Inst. of Tech., Cambridge (USA)). Nov 1981. 259p. NTIS, PC A12/MF A01.

A super conducting magnet system conceptual design to meet the requirements of a magnetohydrodynamic test facility power train is presented. A detailed description of the magnet is accompanied by numerous engineering drawings. Functional requirements, system interfaces, and design criteria are reviewed. System limits, safety precautions, operational procedures, and maintenance procedures are discussed.

20882 **(NASA-CR—165453) MHD oxidant intermediate temperature ceramic heater study. Final report.** Carlson, A.W.; Chait, I.L.; Saari, D.P.; Marksberry, C.L. (Burns and Roe, Inc., Woodbury, NY (USA); FluiDyne Engineering Corp., Minneapolis, MN (USA)). Sep 1981. 199p. NTIS, PC A09/MF A01.

The use of three types of directly fired ceramic heaters for preheating oxygen enriched air to an intermediate temperature of 1144K was investigated. The three types of ceramic heaters are: (1) a fixed bed, periodic flow ceramic brick regenerative heater (2) a ceramic pebble regenerative heater. The heater design, performance and operating characteristics under conditions in which the particulate matter is not solidified are evaluated. A comparison and overall evaluation of the three types of ceramic heaters and temperature range determination at which the particulate matter in the MHD exhaust gas is estimated to be a dry powder are presented.

20883 **Method of generating electricity using an endothermic coal gasifier and MHD generator.** Lytle, J.M.; Marchant, D.D. (to Dept. of Energy). US Patent 4,345,173. 17 Aug 1982. Filed date 12 Aug 1980. vp.

PAT-APPL-177327.

A system and method of generating electrical power wherein a mixture of carbonaceous material and water is heated to initiate and sustain the endothermic reaction of carbon and water thereby providing a gasified stream containing carbon monoxide, hydrogen and nitrogen and waste streams of hydrogen sulfide and ash. The gasified stream and an ionizing seed material and pressurized air from a preheater go to a burner for producing ionized combustion gases having a temperature of about 5000° to about 6000° F which are accelerated to a velocity of about 1000 meters per second and passed through an MHD generator to generate dc power and thereafter through a diffuser to reduce the velocity. The gases from the diffuser go to an afterburner and from there in heat exchange relationship with the gasifier to provide heat to sustain the endothermic reaction of carbon and water and with the preheater to preheat the air prior to combustion with the gasified stream. Energy from the afterburner can also be used to energize other parts of the system.

3005 Fuel Cells

20884 **(ANL—82-67) Advanced-fuel cell development. Progress report, July-September 1981.** Pierce, R.D.; Arons, R.M.; Dusek, J.T.; Fraioli, A.V.; Kucera, G.H.; Ryan, L.J.; Sim, J.W.; Smith, J.L.; Stapay, J.R. (Argonne National Lab., IL (USA)). Dec 1982. Contract W-31-109-ENG-38. 47p. NTIS, PC A03/MF A01. Order Number DE83007810.

The report describes fuel cell research and development activities at Argonne National Laboratory (ANL) during the period July through September 1981. These efforts have been directed toward (1) improving understanding of component behavior in molten carbonate fuel cells and (2) developing alternative concepts for components. The principal focus has been on the development of cathodes fabricated form NiO, sintered γ-$LiAlO_2$ electrolyte supports, and diffusion barriers to prevent gas cross-leakage. Cell tests were performed to assess variables affecting diffusion and to study cathode potential relaxation following current interruption.

20885 **(CONF-820508—7) Electrolyte vaporization losses from molten-carbonate fuel cells.** Ong, E.T.; Claar, T.D. (Institute of Gas Technology, Chicago, IL (USA)). 1982. Contract AC02-78ET11276;AC02-80ET17019. 28p. NTIS, PC A03/MF A01. Order Number DE83009382.

From Spring meeting of the Electrochemical Society; Montreal, Canada (9 May 1982).

Electrolyte loss by vaporization has been identified as a significant performance-degradation mechanism in molten-carbonate fuel cells. The continuous nature of electrolyte vaporization leads to development of tile porosity, which results in increased cell resistance, gas crossover, and loss of structural integrity. In this paper, electrolyte losses from fuel cells reported by different investigators are reviewed and out-of-cell measurements of vapor loss from carbonate melts performed at IGT are presented. These out-of-cell vapor losses are then compared with vaporization losses determined from fuel cells operated for 10,000 hours.

20886 **(CONF-8104192—1) National fuel-cell program.** Nelson, P.A.; Hagey, G.; Shimotake, H. (Argonne National Lab., IL (USA); Department of Energy, Washington, DC (USA)). 1981. Contract W-31-109-ENG-38. 16p. NTIS, PC A02/MF A01. Order Number DE83007753.

From Forum on fuel cell and secondary batteries for load leveling; Tokyo, Japan (13 Apr 1981).

Fuel cells are being developed in programs involving industry, utilities, the Department of Energy, the Electric Power Research Institute, the Gas Research Institute, the National Aeronautics and Space Administration, and the Department of Defense. The development and funding of fuel cells in this diverse program is coordinated by the National Fuel Cell Coordinating Group. Systems having phosphoric acid electrolyte are under development for electric utility, industrial and residential applications. These systems will use a variety of fuels from which hydrogen can be derived, such as liquid and gaseous hydrocarbons and alcohols. Advanced fuel cells, having molten carbonate or solid oxide electrolytes and operating at 650°C and 1000°C, respectively, are also being developed for the above applications and for central power stations in which the fuel gas is prepared in a coal gasification plant. The advantages of fuel cells are projected to be high electrical efficiency, low pollution rates, and siting flexibility.

20887 (DOE/ET/11320—T9) **High-temperature fuel-cell research and development. Final technical progress report, 1 Oct 1980-30 Sep 1981.** Lessing, P.; Johnston, M. (Montana Energy and MHD Research and Development Inst., Inc., Butte (USA)). Oct 1981. Contract AC02-77ET11320. 81p. NTIS, PC A05/MF A01. Order Number DE83007925.

This year end report describes work completed on the following tasks: (1) Molten carbonate electrolyte-matrix fabrication and reinforcement using fibers; (2) surface studies of molten carbonate interactions with various metal and ceramic fuel cell components. A novel process has been developed whereby the electrolyte-matrix is batch formulated, tape cast, and hot rolled. The resulting tapes appear to be strong and have good densities but have yet to be tested in an operating environment. Advancing and receding contact angles of molten carbonates (pure and contaminated) on metal and ceramic substrates under various atmospheres at many temperatures are reported. The carbonate composition $(.62Li-.38K)_2CO_3$ exhibits varying degrees of nonwetting in reducing atmospheres (fuel gas) with metal substrates, but wets ceramic (oxides) under both reducing and oxidizing conditions. Temperature and impurities have measurable effects on the contact angles. The application of contact angle and surface tension data to the molten carbonate fuel cells system is discussed in Appendix II.

20888 (DOE/NASA/0251—1) **Study to establish cost predictions for the production of Redox chemicals.** Ammann, P.R.; Loreth, M.; Harvey, W.W. (Charles River Associates, Inc., Boston, MA (USA)). Jul 1982. Contract AI04-80AL12726. 60p. (NASA/CR—167882). NTIS, PC A04/MF A01. Order Number DE83008280.

The chromium and iron chloride chemicals are significant first costs for NASA Redox energy storage systems. This study was performed to determine the lowest cost at which chromium and iron chlorides could be obtained for a complex of Redox energy storage systems. In addition, since the solutions gradually become intermixed during the course of operation of Redox units, it was an objective of this study to evaluate schemes for regeneration of the operating solutions. Three processes were evaluated for the production of chromium and iron chlorides. As a basis for the preliminary plant design and economic evaluation, it was assumed that the plant would produce about 25,000 tons of contained chromium as $CrCl_3$ and an equivalent molar quantity of $FeCl_2$. Preliminary plant designs, including materials and energy balances and sizing of major equipment, were prepared, and capital and operating costs were estimated.

20889 (DOE/R5/10319—1) **High-efficiency residential fuel-cell energy systems. Final report.** Kashkari, C. (Akron Univ., OH (USA). Dept. of Electrical Engineering). Feb 1983. Contract FG02-81R510319. 60p. NTIS (US Sales Only). Order Number DE83008390.

This report includes a basic analysis of a new idea - the use of small fuel cells to supply electricity to homes. The fuel cell would be operated in the cogeneration mode - waste heat would be utilized for home heating and the energy efficiency of the fuel-cell system will be in the range of 80 to 90%. A computer program was used to simulate the system. The results showed that large amounts of heat would be available for domestic heating. Small fuel cells have been manufactured in this country, and there is no technical problem in developing fuel-cell residential energy systems. The only problem appears to be with economics. By promoting such systems on a large scale, fossil-fuel energy resources would be conserved. The economic analysis shows that, at this time, fuel-cell systems would be expensive as compared to conventional energy systems. But if adopted on a large scale, the prices should come down and fuel-cell systems may become economically viable.

20890 **Fuel cell stack arrangements.** Kothmann, R.E.; Somers, E.V. (to Dept. of Energy). US Patent 4,342,816. 3 Aug 1982. Filed date 22 Apr 1981. vp.

PAT-APPL-256419.

Arrangements of stacks of fuel cells and ducts, for fuel cells operating with separate fuel, oxidant and coolant streams are described. An even number of stacks are arranged generally end-to-end in a loop. Ducts located at the juncture of consecutive stacks of the loop feed oxidant or fuel to or from the two consecutive stacks, each individual duct communicating with two stacks. A coolant fluid flows from outside the loop, into and through cooling channels of the stack, and is discharged into an enclosure duct formed within the loop by the stacks and seals at the junctures at the stacks.

32 ENERGY CONSERVATION, CONSUMPTION, AND UTILIZATION

3201 Buildings

REFER ALSO TO CITATION(S) 19977, 20084, 20098, 20193, 20739, 20785, 20863, 20974, 20995

20891 (AD-A—115182/8) **Validation data for mechanical system algorithms used in building energy analysis programs. Final report.** Dolan, W. (Army Construction Engineering Research Lab., Champaign, IL (USA)). Feb 1982. 177p. (CERL-TR-E—177). NTIS, PC A09/MF A01.

A study is described which collected data developers can use to validate the algorithms used by building energy analysis computer programs to model system and central plant performance of typical heating, cooling, and ventilating (HVAC) systems. Building energy analysis programs compute (1) loads imposed on building environmental control systems for each zone, (2) loads imposed on central equipment (using the zone loads and system performance algorithms), and (3) the primary energy demanded by the central- and zone-specific components. The information collected during this study made it possible to compare actual system performances with computer-generated results of system performances. In addition, this study identified some problems common to HVAC systems, including (1) often unreliable controls performance such as drifting away from calibration and poor repeatability, and (2) as-delivered components which do not operate at manufacturers' specifications.

20892 (AD-A—119595/7) **Conduction phase change beneath insulated heated or cooled structures.** Lunardini, V.J. (Cold Regions Research and Engineering Lab., Hanover, NH (USA)). Aug 1982. 48p. (CRREL—82-22). NTIS, PC A03/MF A01.

The problem of thawing beneath heated structures on permafrost (or cooled structures in non-permafrost zones) must be addressed if safe engineering designs are to be conceived. In general, there are no exact solutions to the problem of conduction heat transfer with phase change for practical geometries. The quasi-steady approximation is used here to solve the conductive heat transfer problem with phase change for insulated geometries including infinite strips, rectangular buildings, circular storage tanks, and buried pipes. Analytical solutions are presented and graphed for a range of parameters of practical importance.

20893 (ANL/ENG—82-03) **Study of lighting-system retrofits for energy conservation at ANL-East. In-house Energy Management Surveys and Studies.** York, R.J.; Hirsch, P.R. (Argonne National Lab., IL (USA)). Sep 1982. Contract W-31-109-ENG-38. 133p. NTIS, PC A07/MF A01. Order Number DE83007813.

A number of approaches or techniques gaining recognition and acceptance are: some high-output fluorescent lighting fixtures, high pressure sodium lighting for indoor use, electronic ballasts, specially designed electromagnetic ballasts and compatible lamps, daylight control, task-ambient lighting, time-controlled switching, and manual three-position switching. The objective of this study is to determine the energy and cost benefits obtainable from the application of these specific energy conservation lighting techniques to selected Laboratory building areas, and to determine, on the basis of these benefits, what site-wide applications of these energy conservation lighting techniques would be cost effective.

20894 (BNL—32417) Buoyancy-induced flow studies in thermally stratified loop of a double-envelope building. Ghaffari, H.T.; Jones, R.F. (Brookhaven National Lab., Upton, NY (USA)). 1983. Contract AC02-76CH00016. 7p. (CONF-830405—11). NTIS, PC A02/MF A01. Order Number DE83005908.

From 6. annual ASME technical conference on commercial building heating and cooling applications; Orlando, FL, USA (19 Apr 1983).

There is a wide interest in the flow studies of thermally stratified loops of double-envelope houses. These loops primarily serve to hold a moderate air temperature around the inner buildings, and to reduce thermal losses and air movements into the house by diminishing infiltration. Further, if the thermal mechanism of the building is well designed, it may be possible to cause a solar-assisted, buoyancy-induced cycling of the flow during the day and a probable reverse cycling during the night. The benefits of this flow pattern are a possible storage of heat in the ground level of the crawl space during the day, its retrieval at night, and a better mixing of warmed air in various zones of the loop. The double-envelope section of the building to be discussed here was monitored from October 1981 to October 1982. Data collected were debugged and the monitoring system was adjusted and calibrated. Results from this experiment concerning significant local flows are analyzed. Hence, a validation of the conceptual thermal mechanism is obtained, and empirical and analytical assessments are compared.

20895 (CONF-810295—1) Results of laboratory tests on wood-stove emissions and efficiency. Hubble, B.R.; Harkness, J.B.L. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 19p. NTIS, PC A02/MF A01. Order Number DE83007784.

From International trade show and wood heating seminar; New Orleans, LA, USA (21 Feb 1981).

Air-tight, wood-burning stoves were operated in a manner consistent with typical residential heating requirements in order to determine particulate and carbon monoxide emissions and creosote build-up. Test data are presented as functions of burn-rates and stove efficiencies. The principal conclusions are that emissions from the stove used in this study are related to log-size and wood burn-rate and that CO and particulate emissions and creosote build-up increased with increasing efficiency of operation. Therefore, future environmental testing should be conducted at typical stove operating conditions, low burn-rates with large logs. In addition, heat-loss calculations show a trade-off between sensible heat loss and CO-fuel heat loss over the range of burn-rates studied. This indicates that, if further improvements in stove efficiencies are desired, improvements in stove combustion efficiency are needed. This also decreases stove emissions.

20896 (CONF-830122—3) Opportunities for improved residential cool-storage systems. Kuliasha, M.A. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 9p. NTIS, PC A02/MF A01. Order Number DE83007508.

From Electric Power Research Institute cool storage workshop; Palo Alto, CA, USA (19 Jan 1983).

During a nationwide concept test program for residential load management using ice storage data were collected from 208 cool storage installations utilizing storage equipment from four manufacturers and 134 control homes with conventional air conditioning. While the data from these tests are currently being analyzed, the qualitative results from these and other tests indicate a number of areas where opportunities exist for improvements in existing cool storage designs. The problem areas of energy efficiency, reliability, storage capacity, condensing unit capacity, and unit cost and the alternatives which have been suggested for alleviating some of the problems which have been experienced are discussed.

20897 (CONF-8106188—1) New ways of heating and cooling buildings with electricity. Asbury, J.G. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 14p. NTIS, PC A02/MF A01. Order Number DE83007873.

From Workshop on the electric imperative; Monterey, CA, USA (Jun 1981).

Case studies of two electric utility service areas indicate that heating with electricity is cost-competitive with oil and natural gas heating, providing that the electric utility meets its intermediate and base loads with coal and/or nuclear generating plants. (MHR)

20898 (DOE/MA—0004/1) FY 1981 annual report on In-House Energy Management. (USDOE Assistant Secretary for Management and Administration, Washington, DC. Office of Facility Planning and Support). Sep 1982. 57p. NTIS, PC A04/MF A01. Order Number DE83007583.

To promote the efficient and economical use of energy at its facilities, DOE has implemented an In-house Energy Management Program designed to reduce energy consumption and increase energy efficiency in its buildings and general operations. The Department's Energy Management Program includes two major areas of effort: buildings energy conservation and general operations energy conservation. The buildings program effort is directed toward improving energy efficiency in the Department's building envelope energy consumption. The general operations progam is aimed at increased energy efficiency in process, production, research, vehicular, and other equipment energy usage. Detailed surveys of major experimental production operations, as well as buildings energy consumption, have been completed or are underway at DOE sites to identify ways to reduce energy consumption. Retrofit projects submitted by DOE's field offices are reviewed and analyzed. Recommended projects are evaluated and prioritized based on their relative merit in accordance with approved life cycle costing procedures.

20899 (DOE/NBM—3008768) Energy conservation manual for multi-family dwellings. (Myers Associates, Inc., Towson, MD (USA); Dale (Jack) Associates, Inc., Towson, MD (USA)). [nd]. 96p. NTIS, PC A05/MF A01. Order Number DE83008768.

A number of the activities involved in managing fuel consumption in apartments, condominiums, and other multi-dwelling unit buildings are presented, and a number of specific recommendations are listed for operating and maintenance procedures and capital investments in new equipment and materials which can reduce energy consumption in those types of buildings. Roles, responsibilities, and actions to be taken are presented for both landlords and tenants. (LEW)

20900 (DOE/PC/30153—T1) Wood-fuel use in Papua New Guinea: an assessment of industrial combustion equipment. Mendis, M.S. (Mitre Corp., McLean, VA (USA). METREK Div.). Nov 1980. Contract AC22-80PC30153. 239p. NTIS, PC A11/MF A01. Order Number DE83006535.

This report presents the results of an engineering and economic assessment of new and retrofit industrial combustion equipment for wood-fuel use in Papua New Guinea. Existing industrial combustion equipment and practices in Papua New Guinea are appraised. Potential industrial wood-fuel systems that utilize wood, wood wastes, charcoal and pyrolytic oils and which are particularly applicable to Papua New Guinea are identified. An economic assessment of wood-fuel systems is conducted for eleven case studies which are representative of a cross-section of Papua New Guinea industry. Conclusions and recommendations are presented to aid both government and industry in Papua New Guinea in fostering the development of appropriate wood-fuel technologies and thereby help displace the consumption of imported petroleum.

20901 (ERATL—83-01) Building services automation. Final report. Bull, R.G.; Baker, P.D.W. (ERA Technology Ltd., Leatherhead (UK)). Jul 1981. 302p. NTIS PC $170.00.

Automatic systems for controlling building services and energy management are becoming increasingly attractive to users of buildings of quite modest sizes and achieve remarkable pay-back periods averaging less than 15 months. The choice of systems available, usually based on microprocessor technology, is difficult for potential users. This report describes the main systems available and compares 35 case studies of users carefully selected to represent current UK practice. It describes the factors which affected their choice and analyses the benefits obtained compared with those expected.

20902 (EUR—7048-EN) Analysis of the factors which determine the COP of a heat pump and a feasibility study on ways and means of increasing same. Fordsmand, M.; Eggers-Lura, A. (Commission of the European Communities, Luxembourg). 1981. 131p. Available from Commission of the European Communities, Luxembourg.

The various possibilities of heat extraction and heat delivery for a water/water heat pump are reviewed, and their technical and economical merits are evaluated. Data are presented on the conditions in the ground. Data relating to ground heat pumps in combination with solar collectors are presented. Two simplified models are described for the calculation of the heat output from horizontal and vertical ground pipes. The Skive-house and its solar/heat pump installation are described, and data are presented from the first 18 months' measurements on same.

20903 (EUR—7939-DE) Signal transmission via the electrical house wiring system for a control system for energy conservation in households and small business. Neudorfer, E.; Radde, H.; Sewald, A. (Commission of the European Communities, Luxembourg). 1982. 94p. (In German). Commission of the European Communities, Luxembourg.

The objective of this project was the definition of a serial data transmission unit which uses the electric house wiring for transmission and which is intended to support the application of microelectronic for the purpose of energy conservation in household and small business. First the requirements to a 'Energy Management System' (Measurement, Control Optimisation) in household and small business, the limitation, caused by system environment, and the state of the art have been examined. After design and experimental examination of different solutions of particular functions, samples of a transmission and interface module have been built up and tested within a special test arrangement and with the real mains.

20904 (GAO/HRD—82-77) Millions can be saved through better energy management in federal hospitals. (General Accounting Office, Washington, DC (USA). Office of the Comptroller General). 1 Sep 1982. 61p. General Accounting Office, P.O. Box 6015, Gaithersburg, MD 20760.

Report to The Congress .

A comparison of the energy savings achieved by hospitals of the Navy, Veterans Administration, and Indian Health service - all of which have energy conservation programs - with that of five non-federal hospitals having aggressive energy management programs indicated that these agencies could save between $16 million and $55 million more each year if additional energy-saving measures were adopted. The investment required to achieve these savings would be quickly recouped. GAO believes that additional energy-saving opportunities also exist at the Army and Air Force hospitals. Two important program elements - technical audits to identify cost-effective energy conservation measures and accountability to ensure that the measures are implemented - are generally missing or incomplete in federal hospitals' energy conservation efforts. By increasing emphasis on these elements, federal agencies could achieve many of the yet unrealized energy savings.

20905 (LA-UR—83-397) Energy-conservation study for the US Air Force Academy. Peterson, J.L.; Davis, L.B. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 127p. (CONF-830319—1). NTIS, PC A07/MF A01. Order Number DE83007554.

From US Air Force Academy energy management personnel meeting; Colorado Springs, CO, USA (1 Mar 1982).

The United States Air Force Academy (AFA) has asked the Los Alamos National Laboratory to assist them in conducting detailed energy and solar analyses of selected AFA buildings using the DOE-2 building energy analysis computer program. The results of the energy conservation study conducted by Los Alamos in FY 1981 and 1982 for Building 2360 (Vandenberg Hall), Building 2169 (Field House), and Building 2410 (Aeronautics Laboratory) are presented. Energy Conservation and Solar Opportunities (ECOs) are identified for each building and predicted heating, cooling and electric energy savings are presented for each ECO. Economic results are summarized as annual dollars saved, discounted benefit-to-cost ratio, maximum investment targets, and the life-cycle cost of implementing each ECO.

20906 (LBL—15183) Energy efficiency in Chinese apartment buildings: parametric runs with the DOE.2 computer program. Huang, Y.J.; Canha de Piedade, A.; Rosenfeld, A.H.; Tseng, D. (Lawrence Berkeley Lab., CA (USA)). Nov 1982. Contract AC03-76SF00098. 32p. (CONF-821121—3; EEB—82-3). NTIS, PC A03/MF A01. Order Number DE83008253.

From 1. US/China conference on energy, resources and environment; Beijing, China (7 Nov 1982).

Using a typical-design uninsulated Beijing apartment building as a base case, we have used the DOE.2 energy analysis program to study the cost-effectiveness of more energy-efficient building design. Two measures have attractive simple payback times: reduced infiltration (one to two years payback) and insulation of the north wall (six years). The cost of conserved coal for the insulation measure is 1.3 Yuan/GJ, which is less than half the international price of coal. This insulation adds only 0.6% to the first cost of the building, yet, combined with more attention to infiltration, it reduces annual heat load from 230 MJ/m^2 to 130. The first cost of these two measures is probably offset by downsizing the heating plant. In Shanghai, reduced infiltration and insulation are justified not on the basis of saving fuel, but because they make the dwellings much more comfortable.

20907 (LBL—15374) Progress in energy-efficient buildings. Wall, L.W.; Rosenfeld, A.H. (Lawrence Berkeley Lab., CA (USA)). Dec 1982. Contract AC03-76SF00098. 25p. (CONF-830211—1). NTIS, PC A02/MF A01. Order Number DE83006953.

From 5. energy audit symposium and productivity exposition of the Association of Energy Engineers; Los Angeles, CA, USA (17 Feb 1983).

Recent accomplishments in buildings energy research by the diverse groups in the Energy Efficient Buildings Program at Lawrence Berkeley Laboratory (LBL) are summarized. Technological progress is reviewed in the areas of ventilation and indoor air quality, buildings energy performance, computer modelling, windows, and artificial lighting. The need for actual consumption data to track accurately the improving energy efficiency of buildings is being addressed by the Buildings Energy Data (BED) Group at LBL. Results to date are summarized from the Building Energy Use Compilation and Analysis (BECA) studies, which include time trends in the energy consumption of new commercial and new residential buildings, the measured savings being attained by both commercial and residential retrofits, and the cost-effectiveness of buildings energy conservation measures. Recent comparisons of predicted vs actual energy usage/savings, and present the case for building energy use labels are also examined.

20908 (N—8229715) Retrofit energy conservation in residential buildings in southern California. Turner, R.H.; Birur, G.C.; Daksla, C. (Jet Propulsion Lab., Pasadena, CA (USA)). Jun 1982. 43p. (NASA-CR—169137; JPL-PUBL—82-55). NTIS, PC A03/MF A01.

The common energy conservation techniques (ECTs) that can be retrofit-installed into residential buildings are surveyed. The quantity of saved energy for heating and cooling attributable to each ECT is evaluated for three common modes of heating: natural gas heating at 60/therm heating via heat pump at $1.20/therm and electric resistance heating at $2.40/therm. In every case, a life cycle cost comparison is made between the long term revenue due to energy conservation and a safe and conventional alternative investment that might be available to the prudent homeowner. The comparison between investment in an ECT and the alternative investment is brought into perspective using the life cycle payback period and an economic Figure of Merit (FOM). The FOM allows for relative ranking between candidate ECTs. Because the entire spectrum of winter heating climates in California is surveyed, the decision maker can determine whether or not a considered ECT is recommended in a given climate, and under what conditions an ECT investment becomes attractive.

20909 (NASA-TM—83175) **Design of an energy conservation building.** Jensen, R.N. (National Aeronautics and Space Administration, Hampton, VA (USA). Langley Research Center). Nov 1981. 32p. NTIS, PC A03/MF A01.

The concepts in designing and predicting energy consumption in a low energy use building are summarized. The building will use less than 30,000 Btu/sq.ft./yr. of boarder energy. The building's primary energy conservation features include heavy concrete walls with external insulation, a highly insulated ceiling, and large amounts of glass for natural lighting. A solar collector air system is integrated into the south wall. Calculations for energy conservation features were performed using NASA's NECAP Energy Program.

20910 (NP—3900026) **Heat transfer through transparent and non-transparent outer walls with a curtain of adjustable light shades.** Gehlisch, K. (Technische Univ. Muenchen (Germany, F.R.). Fakultaet fuer Maschinenwesen). 24 Jul 1981. 185p. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83900026.

Thesis.

The use of so-called louvers - a method applied and approved in astronautics - in buildings in order to save energy is studied. Shutters in buildings have got the function of influencing the radiation from and to the building in such a way that the need for heating and cooling is reduced. A physical model of a louver system is developed which can be computed by a mathematical calculus. For the mathematical model a computer code is set up allowing to simulate the environmental conditions. Experimentally heat transfer on a vertical wall is investigated using a system of shutters. The results are compared with published data. In addition the studies are extended to the use of shutters in front of windows.

20911 (NYSERDA—82-26) **Design and demonstration of a storage assisted air conditioning system.** (Long Island Lighting Co., Mineola, NY (USA); State Univ. of New York, Stony Brook (USA)). Apr 1982. Contract W-7405-ENG-26. 93p. NTIS, PC A05/MF A01. Order Number DE83008255.

One phase-change material, sodium sulfate decahydrate, has generated considerable interest for thermal storage. A form of this material containing salts to adjust the transition point to approximately 55°F and a gelling agent to prevent segregation of the salts has been developed. This material is packaged in the form of a CHUB, (a cylinder two inches in diameter and twenty inches long) having a weight of 3.25 pounds and a thermal storage capability of 50 Btu per pound. Under this project, a storage-assisted (partial storage) air conditioning system was designed, installed, monitored and evaluated in a typical residential application. This feasibility demonstration was conducted under the direction of the Long Island Lighting Company in a single family residence in Melville, Long Island, New York. The demonstration system consisted of a CHUB thermal storage system utilized in conjunction with a one and one-half ton air conditioning unit to cool a house that would normally require a two and one half ton air conditioning unit.

20912 (ORNL/CON—120) **Methods to deal with self-selection in estimating conservation-program energy savings: use of synthetic data to test alternative approaches.** Hirst, E.; Trimble, J.; Goeltz, R.; Cardell, S. (Oak Ridge National Lab., TN (USA)). Mar 1983. Contract W-7405-ENG-26. 47p. NTIS, PC A03/MF A01. Order Number DE83008138.

Because energy-conservation programs are generally voluntary, households that choose to participate in the programs are almost certain to be different from nonparticipants in important energy-related ways. This self-selection bias greatly complicates efforts to estimate energy savings due to the program. Several methods for dealing with self-selection are discussed. The methods involve either nonrandom sampling of program nonparticipants, binary choice models that explicitly treat household decisions to participate and to retrofit, or both. Because some of the methods discussed are new and have not yet been applied to analysis of energy-conservation programs, a synthetic data set was developed. Numerical experiments were conducted with this data to examine the performance of these different methods. These experiments show that the improved sample design and analytical techniques generally yield more-accurate estimates of program energy savings. Our experience also suggests that a small, well-defined synthetic data set is very helpful in developing, debugging, and evaluating software associated with new analytical approaches.

20913 (ORNL/CON—121) **Residential Conservation Service Program: summary of the second annual reports submitted to the US Department of Energy by states and nonregulated utilities. Final report.** Morris, L.E.; Frogge, L.M.; Ehrenshaft, A.R.; Riordan, J.M. (Oak Ridge National Lab., TN (USA)). Feb 1983. Contract W-7405-ENG-26. 135p. NTIS, PC A07/MF A01. Order Number DE83008304.

This report is a presentation and summary of the data submitted in the second Annual Reports by States and Non-Regulated Utilities detailing the activity level of Residential Conservation Service (RCS) Program elements on a national, state, and local level as of March 31, 1982. Several tables are included which present the reported data (i.e., number of eligible customers, number of audits performed, utility services offered, and RCS Program implementation costs) in a format where state-to-state and utility-to-utility comparisons can be made. Comparative analysis indicates that the program information submitted in the Annual Reports is incomplete and varies significantly from one state or utility to another.

20914 (ORNL/Sub—9001/1) **Aerial measurement of heat loss: Phase II.** (Calspan Corp., Buffalo, NY (USA)). Jul 1982. Contract AC01-78CS20415. 174p. (NYSERDA—82-7). NTIS, PC A09/MF A01. Order Number DE83002729.

The purpose of the program described was to develop techniques to reduce or eliminate some of the variables associated with thermogram analysis in order to provide more objective interpretation of the data collected with greater potential for accuracy. A procedure is given for measuring temperature which accounts for atmospheric, background, and differential emissivity effects. The residual error was found to be 1.0°C. A technique was then identified and developed for determining heat loss lovels from roof top surface temperature data. A thermal integrity factor was defined as a function of insulation level and thermostat setting. Comparing these thermal integrity factors with aerial thermography data indicates that aerial thermography can be used to objectively and confidently define heat loss levels from building roofs. (LEW)

20915 (P—400-81-022) **1981/82 nonresidential building standards development project: use of computerized graphics to optimizae building energy use in predesign and programing.** Busch, R.D.; Bickle, L.W. (California Energy Resources Conservation and Development Commission, Sacramento (USA). Conservation Div.). Aug 1981. 6p. California Energy Commission, 1516 Ninth Street, Sacramento, CA 95814.

The energy graphics method has been developed and refined. This technique utilizes a series of plots to compare te external and internal effects on the overall energy use in a building. To enhance this technique, we have put it on the computer and included the effects of mass and deadband thermostat in the program. Utilizing the architectural program and client information, the designer has two possible techniques for reducing the energy consumption in the building: (1) reduce the auxiliary load required by minimizing the heat gain or heat loss that occurs at that particular point in time; or (2) shift the heat gain or heat loss out of the occupied time so that the comfort onditions in the building are less restrictire. Utilizing the visual graphics from the program, the designer can go through a systematic process inreducing and shifting the heat losses and heat gains so that the auxiliary load on the building is minimized.

20916 (PB—82-205212) **Evaluation of the Vuilleumier heat pump for heating applications. Vtt research report.** Nykyri, M.; Hiismaeki, P. (Valtion Teknillinen Tutkimuskeskus, Espoo (Finland). Reaktorilab.). [nd]. 30p. NTIS, PC A03/MF A01.

A general evaluation of the performance of a Vuilleumier heat pump for residential heating is given. The basic considerations were devoted to the choice of hot, intermediate and cold operating volumes and temperatures, to the phase angle of the two displacers, to the dead volumes and to the choice of the working gas. Specific attention was then paid to the heat transfer problems at each of the three temperatures.

20917 **(PB—82-220575) Effect of building characteristics on gas-appliance performance and end-use efficiency. Final report 1 Dec 80-31 Oct 81.** Zawacki, T.S.; Cole, J.T.; Huang, V.; Macriss, R.A. (Institute of Gas Technology, Chicago, IL (USA)). May 1982. 82p. NTIS, PC A05/MF A01.

Analyses of the effect of how building structure and other factors influence retrofit performance were carried out through analytical investigations and measurements in homes. A data base of 65 sites was established from screening 2600 sites. A comprehensive list of operative factors linking retrofit effectiveness to structural and installation factors was developed and used. Semi-empirical relationships were developed to estimate retrofit effectiveness based on easily measured or observed parameters.

20918 **(PB—82-227661) High-efficiency, gas-fired heat-pipe, warm-air heating system. Final report on phase 1, Jun 79-Jun 81.** Becker, F.E.; Searight, E.F.; Sumberg, A.J. (Thermo Electron Corp., Waltham, MA (USA)). Dec 1981. 49p. (TE—4296-133-82). NTIS, PC A03/MF A01.

A totally integrated gas-fired, warm-air heating system has been developed. The design concept combines a unique high-efficiency heat-pipe furnace capable of being continuously modulated to match the heat-load requirement, a novel distribution system with individual thermostatically controlled room diffusers, and a control system designed to provide maximum furnace efficiency at all load levels and to allow for individual room temperature control. A prototype 100,000-Btu/hr heat-input warm-air furnace has been built and tested. The furnace is approximately one-half the size of most conventional units and operates with a steady-state efficiency of 86 percent. The furnace has successfully operated through a turndown ratio of 4 to 1. A simple, reliable, thermostatically controlled room diffuser has also been developed and life cycle tested.

20919 **(PB—82-229634) Cross-subsidization and competition: a case study of gas and electric utility involvement in residential energy conservation. Final report.** Mead, W.J.; Parsons, S.G.; Sorensen, P.E. (California Univ., Santa Barbara (USA). Community and Organization Research Inst.). 23 Jun 1982. 208p. NTIS, PC A10/MF A01.

Frequently profits from one level of operation or in one product line are used by vertically integrated or conglomerate firms to subsidize sales made at another level or in another industry. This permits price cutting which can drive small firms out of business. This study will include the development of a theoretical model of firm behavior on potential gains versus losses from cross subsidization. The model will be tested using data on the sale of home insulation materials and services by electric and gas companies.

20920 **(PB—82-229915) Economic assessment of residential retrofit electricity conservation measures: consumer and utility perspectives. Staff report.** House, L.W.; Gertner, P.; Amir, E. (California Energy Resources Conservation and Development Commission, Sacramento (USA)). Oct 1981. 60p. NTIS, PC A04/MF A01.

Analyses of conservation technologies have typically concentrated on consumer investment criteria. This has had the effect of seriously limiting the ability to compare conservation measures directly to energy supply options. A methodology is demonstrated that allows comparison of the cost effectiveness of conservation measures from three different perspectives: a private consumer's perspective (with and without policy incentives); a utility's short-run perspective; and a utility's long-run perspective. Nineteen residential electrical conservation measures currently available were analyzed. From the consumer's perspective, the cost of conserving energy was compared with the price the consumer is expected to pay for electricity over the next 10 years. For the utility's short-run perspective, the cost of conserving energy was compared to the fuel cost of generating that electricity (taking into account time of day and season of energy savings). In the utility's long-run perspective, the cost of conserving energy was compared with the cost of electricity from various existing and new generation facilities. Pacific Gas and Electric Company (PG and E) was the utility analyzed.

20921 **(PB—82-231168) Combustion modification controls for residential and commercial heating systems. Volume I: environmental assessment. Final task report Jun 78-Sep 79.** Castaldini, C.; Brown, R.A.; Lim, K.J. (Acurex Corp., Mountain View, CA (USA). Energy and Environmental Div.). Jul 1981. 177p. NTIS, PC A09/MF A01.

An environmental assessment is given of combustion modification techniques for residential and commercial heating systems, with respect to NOx control reduction effectiveness, operational impact, thermal efficiency impact, control costs, and effect on emissions of pollutants other than NOx. Major equipment types and design trends are reviewed, although emissions and control data for commercial systems are very sparse. Natural gas and distillate oil are the principal fuels.

20922 **(PB—82-231176) Combustion modification controls for residential and commercial heating systems. Volume II: oil-fired residential furnace field test. Final task report Jul 78-Jul 79.** Higginbotham, E.B. (Acurex Corp., Mountain View, CA (USA). Energy and Environmental Div.). Jul 1981. 79p. NTIS, PC A05/MF A01.

Methods and results are given of an environmental assessment test program at an oil-fired, low-emission residential heating unit. The aim of the program was to measure emission changes resulting from changing the operating mode of the low-emission furnace. Emissions of trace elements, organic materials, sulfur species, NO, CO, hydrocarbons, and particulate matter were measured. Both continuous and cyclic operating modes were evaluated.

20923 **(PB—82-260811) Nontechnical summary of the final report 'optimal weatherization of low-income housing in the united states: a research demonstration project'. Final report Sep 77-Sep 81.** Margulis, S.T.; Clark, R.E. (National Bureau of Standards, Washington, DC (USA). Center for Building Technology). Aug 1982. 45p. NTIS, PC A03/MF A01.

In nontechnical language the nature and results are summarized of the Community Service Administration's (CSA's) Optimal Weatherization Demonstration Research Project carried out by the National Bureau of Standards (NBS). The CSA/NBS demonstration installed both architectural (Building shell) and mechanical systems weatherization options, and achieved, when both types of options were used, an average reduction in space heating fuel consumption of 41 percent, at an average weatherization cost of $1,862 per house.

20924 **(PB—82-262296) Building digests: heating and thermal aspects of building.** Chandra, P.; Agarwal, K.N.; Jain, S.P.; Sharma, M.R.; Ali, S. (Central Building Research Inst., Roorkee (India)). 1981. 94p. NTIS, PC A05/MF A01.

Fourteen bulletins are compiled covering: Thermal Performance of Building Sections in Different Thermal Climatic Zones of the Country; Thermal Response of 4.5 inch Solid Brick Wall Room in Hot-Dry Climates; Evaluation of Thermal Stress-Tropical Summer Index; Correction Factors for Thermal Performance Index; Thermal Performance Rating and Classification of Walls in Hot Climate; Thermal Performance Rating and Classification of Flat Roofs in Hot Dry Climates; Thermal Insulation at Low Temperature; Thermal Data of Building Fabrics and its Application in Building Design; Assessment of Solar Radiation on Buildings; Determination of Tropical Summer Index in Office Buildings; Determination of Sunlight Penetration Indoors; Orientation of Buildings; The Climatic and Environmental Zones for India - Simplified Advice for Building Design; and Thermal Considerations in Building Design - Insulated Masonry Structures. These bulletins provide comprehensive, step-by-step instructions on how to make full use of the techniques described. Many graphs and charts are provided.

20925 **(PB—82-262957) For building and construction. Technical notes.** Bansal, G.D.; Sharma, D.; Prakash, C.; Rao, K.R.; Jain, S.P. (Central Building Research Inst., Roorkee (India)). 1981. 58p. NTIS, PC A04/MF A01.

Sixteen technical notes are compiled coveering: Apertures other than Northlights; Design of pile caps; thermal insulation of roofs of industrial buildings; room heating by solar energy; charging device for small capacity lime kilns; waste water disposal system for rural areas; low cost sound absorbing materials; solar space heating system; pedestal piles for low cost houses; solar timber seasoning kiln; design of cold storage for fruits and vegetables; techniques for improved thatch roofs; resilient floors for structural noise reduction; plastic composite panels for partition claddings and flush doors; chimney design for domestic kitchens; and a cheap and effective fire retardant treatment for paddy thatch/coconut leaves/palmyrah thatch. The notes give brief descriptions of the design and use of the materials and techniques covered.

20926 (PB—82-266271) Building digests: cooling of buildings. Verma, V.V.; Agarwal, K.N.; Chadra, P.; Jain, S.P.; Sharma, M.R. (Central Building Research Inst., Roorkee (India)). 1981. 47p. NTIS, PC A03/MF A01.

Nine bulletins are compiled covering: Control of Solar Heat Gain through Glass Windows; Simple and Effective Roof Spraying System of Cooling Buildings in Hot Dry Climates; Shading Devices for Glass Openings in Air-conditioned Buildings; Cooling of Buildings by Roof Surface Evaporation; Roof-surface Evaporative Cooling of Buildings by Water Soaked Gunny Bags; Loose Fill Materials for Cold Storage Insulation; Cooling Load and Indoor Air Temperature of Office Buildings under Tropical Climate; Thermal Design of Potato Cold Storage; and Suitability of Rice-husk and Saw-dust as a Cold Storage Insulation. These bulletins provide comprehensive, step-by-step instructions on how to use the materials and techniques covered.

20927 (PB—83-100479) Energy and the built environment. Olofsdotter, B. (Statens Raad foer Byggnadsforskning, Stockholm (Sweden)). 1982. 77p. NTIS, PC A05/MF A01.

Contents include Swedish energy policy; Energy supply; The built environment; A strategy for conversion of the Swedish energy system; Energy planning; Transport; Low-energy building and building services; Low-energy houses; Heat pumps; Solar energy space heating; Heat storage.

20928 (PB—83-101907) Building digest - general building aspects. Damodaran, K.; George, J.; Rehsi, S.S.; Singh, S.; Sofat, G.C. (Central Building Research Inst., Roorkee (India)). 1981. 76p. NTIS, PC A05/MF A01.

Thirteen bulletins are compiled covering Flush Doors; Wood Seasoning; Proportioning of Fly Ash Concrete Mix; The Yield of Mortar and Concrete Mix; Solar Water Heater - Domestic Type; Units for Living; Plastics and their Applications in Buildings; Hardboard and Particle Board; Woodwool Board; Material Constants in Building Works; Check-list for Taking Over Newly Constructed Buildings; Some Typical Enquiries and their Replies; and Energy Conservation in Buildings. These bulletins provide a comprehensive, step-by-step set of instructions on how to make and use the materials and techniques covered. Wood preservation and termite and rodent resistance of plastic pipes is also covered.

20929 (PB—83-117317) Optimal weatherization of low-income housing in the U.S.: a research demonstration project. Building science series (final). Crenshaw, R.; Clark, R.E. (National Bureau of Standards, Washington, DC (USA). Center for Building Technology). Sep 1982. 172p. NTIS, PC A08/MF A01.

This report describes and presents the results of the Community Service Administration's (CSA's) Optimal Weatherization Demonstration Research Project carried out by the National Bureau of Standards (NBS). The CSA/NBS demonstration installed both architectural (building shell) and mechanical systems building weatherization options, and achieved, when both types of options were used, an average reduction in space heating fuel consumption of 41 percent, at an average weatherization cost of $1,862 per house.

20930 (PB—83-117382) Evaluation of existing programs for simulation of residential building energy use. Final report. Merriam, R.L.; Rancatore, R.J. (Little (Arthur D.), Inc., Cambridge, MA (USA)). [nd]. 255p. NTIS, PC A12/MF A01.

A review and evaluation of residential building energy analysis programs is carried out in six steps: (1) survey of the experience and needs of electric and gas utilities in residential building energy analysis; (2) identification and characterization of currently available programs capable of residential energy use analysis; (3) examination and summary of the intended capabilities of ten programs; (4) indepth analysis of the engineering bases of five programs; (5) test of the same five programs; and (6) establishing the strengths and limitations of the programs. Classification of the various analysis methods for estimating residential energy use is provided as a background for the study. The history of the development of the various programs is summarized and the various thermal loads algorithms commonly employed are discussed.

20931 (PB—83-118646) Building technology project summaries, 1981-1982. Special pub. Raufaste, N.; Olmert, M. (National Bureau of Standards, Washington, DC (USA). Center for Building Technology). Sep 1982. 74p. NTIS, PC A04/MF A01.

Center for Building Technology programs address building construction productivity, structural and geotechnical engineering, building materials, building physics, and building equipment. Typical CBT activities include: investigating failures, such as the Kansas City Hyatt Regency Hotel skywalk collapse, to determine needs for improved design and construction practices; improving measurement techniques, such as development and calibration of a hot-box to accurately determine heat transfer in full-scale complex-work assemblies; defining characteristics of building performance, such as predicting service-life of polymers (a group of materials expected to see much more use during the 21st century); and developing methods to predict the energy performance of new refrigerant mixtures for heat pumps. This report summarizes CBT's research for 1981-1982. Each summary lists the project title, its progress, point of contact within CBT, and sponsor.

20932 (PB—83-118869) Building technology publications supplement 6: 1981. Special pub. (final). Beavers, L. (National Bureau of Standards, Washington, DC (USA). Center for Building Technology). Jun 1982. 98p. NTIS, PC A05/MF A01.

This report presents NBS' Center for Building Technology (CBT) publications for 1981. It is the sixth supplement to NBS Special Publication 457, Building Technology Publications, and lists CBT reports issued during January 1 - December 31, 1981. It includes titles and abstracts of each CBT publication and those papers published in non-NBS media, key word and author indexes, and general information and instructions on how to order CBT publications.

20933 (PB—83-122978) Field correlation of performance standards for organically sealed sinsulating glass. Spetz, J.L. (Sealed Insulating Glass Manufacturers Association, Chicago, IL (USA)). 15 Dec 1980. 280p. NTIS, PC A13/MF A01.

This study correlates the test performance of Sealed Insulating Glass with its performance in use in buildings in the United States. Approximately 2,000 units in approximately 150 buildings are being tested each year for 5 years. The tests measure the amount of moisture between the two panes of sealed glass and determine the level of performance according to specifications. All common generic type of sealant systems, single and dual seal, are represented among the units tested, as are all three desiccant systems and all common sealed corners and corner key constructions. Findings indicate no visual failures of moisture or fog inside any of the units tested and no visual failures on any of the units on the jobs. Summary data sheets and individual job data sheets with all the frost points for the individual cities for the various tests used are included.

20934 (PB—83-123802) Annual housing survey: 1979. United States and regions. part f: energy-related housing characteristics. (Bureau of the Census, Washington, DC (USA)). Mar 1982. 375p. NTIS, PC A16/MF A01.

This report presents statistics on energy - related housing characteristics from the 1979 Annual Housing Survey for the United States by inside and outside standard metropolitan statistical areas (SMSA's) and each of the four geographic regions. The statistics are based on information from a sample of housing units. The information was collected by personal interview from September 1979 to December 1979. For the United States as a whole and for the separate regions (North Central, Northeast, South, and West), data are presented on fuel, fuel cost, heating, air conditioning, insulation, and transportation characteristics in relation to the following information: income of families and primary individuals, value of owner - occupied housing units, gross rent of renter - occupied housing units, housing units in structure, number of rooms per housing unit, year structure built, monthly cost paid for electricity, and others. Also shown are the yearly cost paid for fuel oil, coal, etc. and household head's principal means of transportation to work, by distance and travel time to work in 1979. Data are classified according to all races, black - housing units with black household head, and Spanish - housing units with household head of Spanish origin. Maps and a table - finding guide are provided. Appendices describe the geographic area classifications; define subjects covered in the report; and present information on sample design, estimation, and data accuracy.

20935 (PB—83-124347) Evaluation of the physical condition of public housing stock. Volume I: final report. Final report. (Perkins and Will, Inc., Washington, DC (USA)). 31 Mar 1980. 271p. NTIS, PC A12/MF A01.

This report summarizes a 2 - year study pertaining to modernization, accessibility, and energy conservation in public housing stock. It developed cost estimates to upgrade public housing to three levels of modernization. Level I required the correction of all basic safety and health standards. Level II included the cost of correcting all level I violations as well as all violations of HUD Minimum Property Standards modified to reflect the special conditions of modernization. Level III covered the cost of selected modernization improvements to make projects more habitable, easier to maintain, or more attractive. The national estimate (in 1980 dollars) for level I improvements for 1.17 public housing million units was about $260 million. For level II, the national estimate was $1.506 billion, and for level III, $6.791 billion. The study also developed cost estimates to upgrade public housing to fulfill the national barrier - free legislation requirements. Estimates for major categories of disabilities are delineated for making 58,650 units accessible. In the last area, energy conservation, estimates were developed of the costs and benefits (expressed in terms of discounted payback periods) required to implement a comprehensive list of energy conservation measures in public housing. Tables, figures, and photographs are supplied. Methodology and statistical analyses are appended.

20936 (PB—83-124370) Evaluation of the physical condition of public housing stock. Volume 4: energy conservation. (Perkins and Will, Inc., Washington, DC (USA)). 31 Mar 1980. 352p. NTIS, PC A16/MF A01.

This report assesses the existing energy consumption and energy conservation potential in the Nation's public housing stock. It presents recommended levels of energy saving investment costs based on a cost / benefit analysis. The cost of energy in the public housing stock for 1980 is expected to exceed $740 million, which averages out to over $670 per dwelling unit. The analysis of the total public housing stock was completed in a two - phases survey and analysis process. A total of 350 randomly selected projects were surveyed, and 95 of these were selected for detailed energy analysis. A set of algorithms was developed to determine existing energy use. Following this, potential energy conservation opportunities (ECO's) were analyzed and refined. Energy savings, cost, and discounted payback were estimated for each ECO for all 95 projects, producing over 5,000 results. A method to organize the projects by significant categories of building type and climate was devised. Existing energy use was calculated, using standard algorithms such as those described in engineering manuals. After yearly energy consumption was calculated for each project and prototype, 58 ECO's were analyzed for each project. Based upon this analysis, graphs were produced to illustrate diminishing return of investment. In addition, a separate but coordinated solar analysis to assess potential solar retrofit in public housing was completed. Tables and illustrations are given.

20937 (SBI-R—121) SBI low energy house model 79 - with a 410 mm cavity brick wall. Blach, K.; Kjaer, B. (Research Establishment Risoe, Roskilde (Denmark)). 1980. 32p. (In Danish). NTIS (US Sales Only), PC A03/MF A01. Order Number DE82901185.

The main aim of the project has been to develop a set of design details for cavity brick walls to be used in various low-rise house designs. As a full scale try-out a one-family house was built by a professional client in 1978. The house was sold, but according to prior agreement measurements of the energy consumption could be carried out through the first year of occupancy. In spite of the fact that the winter of 1978/79 was quite severe in Denmark, only about 6000 kWh were used for heating the house, which had an electric radiant heating system. The energy consumption is equivalent to 800 liters of fuel oil, if boiler efficiency is 75%. Electric heating was chosen in order to simplify the recording of energy consumption and distribution in the house. Other heating sources will also be possible. The house is an example of what can be achieved through so called passive energy conservation. The building envelope is highly insulated, cold bridges have been avoided as far as possible, and both walls, ceilings and joints have been made as airtight as possible. Airtightness of the walls has been obtained in a simple way by plastering and wall-papering the interior surfaces. The house is mechanically ventilated in order to avoid inconveniences because of the tightness of the building envelope. An air-to-air heat exchanger is connected to the ventilation system. Cost calculations have been carried out before the design details were approved. Both the house design and the various design details are modular. The Danish standard brick is not modular but can be used for modular brickwork. Also roof trusses, doors, windows, built-in-furniture, etc. are modular components.

20938 (SERI/TP—254-1807) Fourier-transform approach to building simulations with thermostatic controls. Subbarao, K.; Anderson, J.V. (Solar Energy Research Inst., Golden, CO (USA)). Dec 1982. 6p. (CONF-830405—15). NTIS (US Sales Only). Order Number DE83005299.

From 6. annual ASME technical conference on commercial building heating and cooling applications; Orlando, FL, USA (19 Apr 1983).

Analyzing the thermal behavior of a linear system, such as a building (with some commonly made approximations), is greatly simplified in the frequency domain because of the decoupling of different frequencies. Thermostatic controls, an important part of building systems, invalidate this decoupling since they respond only to the temperature at a particular time (i.e., the sum of all frequencies). Nevertheless it is shown here that by suitably formulating the problem, buildings with thermostatic controls can be simulated in the frequency domain, even when the setpoint is a function of time. Thus an hour-by-hour profile of indoor temperature and auxiliary energy requirements can be obtained without doing an hour-by-hour simulation.

20939 (PB—82-238262) Exhaust sensor for heating systems. Rohr, F.J.; Holick, H.; Minor, A.; Rentel, A. (Brown, Boveri und Cie A.G., Heidelberg (Germany, F.R.). Zentrales Forschungslabor). Jul 1982. Translation of Abgassonde fuer Heizungsanlagen, n.p., Oct 80. See also N81-31326.;. 95p. NTIS, PC A05/MF A01.

The development of an electrochemical exhaust sensor and a method for continuous measurement of the air-fuel ratio (AFR) of a burner is described. This ratio determines the efficiency and the contaminant emission of combustion processes. The AFR gauge consists of a zirconium oxide electrolyte sensor and auxiliary equipment for the stabilization of a gas flow and dosage of small gas quantities. Different oil and gas fueled burners were tested and the results demonstrate the proper functioning of the sensor. With its aid feedback optimization of the combustion process is possible. Improvements of burn efficiency of up to 10 percent are reported.

20940 (PB—82-217019) **Lakes as a heat source for residential heating: a survey of costs in comparison with different systems and ecological consequences.** Hellstrom, T. (Institutet foer Vatten- och Luftvaardsforskning, Stockholm (Sweden)). May 1982. Translation of Sjoar som Varmekalla for Bostadsuppvarmning-En overblick over kostnader i Jamforelse med olika system och ekologiska Konsekvenser, n.p., 31p, 4 Jun 80. See also N81-21594.;. 25p. NTIS, PC A02/MF A01.

The low grade energy in lakes and ground water can be used for residential heating by using heat pumps. An economic comparison of different systems was performed. It was assumed that the temperature of the produced hot water would be 60 C, and that the capacity would be 6500 MWh per year. The production costs were calculated but not the distribution costs. The ecologic consequences are discussed.

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REFER ALSO TO CITATION(S) 20892, 20898, 20934, 21016, 21017, 21018, 21019, 21030, 21032

20941 (AD-A—116138/9) **Aircraft energy conservation during airport ground operations. Final report.** Bauchspies, J.S.; Costello, F.A.; Felder, J.; Hilliard, H.; Thompson, J.K. (ORI, Inc., Silver Spring, MD (USA)). Mar 1982. 313p. (ORI-TR—1974). NTIS, PC A14/MF A01.

This study identifies and assesses potential fuel conservation options which are available for use during ground operations at Dulles International (IAD) and Washington National (DCA) airports. The study also identifies and analyzes ground operations fuel savings options which have been considered and/or implemented by the various airlines operating at IAD and/or DCA since 1971. In addition, an evaluation of computer models which could be used for analyzing these fuel conservation options at other airports is included. The impact of socio/economic factors such as safety, environment, limitation on expansion and restrictions on accommodating forecast activity at DCA and IAD were considered during the analysis of each option.

20942 (AD-A—119953/8) **New York City Police Department Automated Fuel Monitoring system. Volume I. Overview. Technical report.** McGrath, W.J.; McNamara, M.M. (Naval Underwater Systems Center, New London, CT (USA). New London Lab.). 1 Oct 1981. 15p. NTIS, PC A02/MF A01.

The New York City Police Department (NYCPD) Automated Fuel Monitoring system is briefly described from the original study, through system design, to implementation. The system provides complete control of fuel usage for an agency with 4,000 motor vehicles and 25,000 vehicle operators. As far as is known, it is the largest system of its kind installed to date. The system can be scaled up or down to meet the needs of other governmental units. Estimated annual cost savings to NYCPD are $2,000,000.

20943 (AD-A—119954/6) **New York City Police Department Automated Fuel Monitoring system. Volume II. Documentation report. Technical report.** McGrath, W.J.; McNamara, M.M. (Naval Underwater Systems Center, New London, CT (USA). New London Lab.). 16 Nov 1981. 361p. NTIS, PC A16/MF A01.

The New York City Police Department (NYCPD) Automated Fuel Monitoring system is briefly described from the original study, through system design, to implementation. The system provides complete control of fuel usage for an agency with 4,000 motor vehicles and 25,000 vehicle operators. As far as is known, it is the largest system of its kind installed to date. The system can be scaled up or down to meet the needs of other governmental units. Estimated annual cost savings to NYCPD are $2,000,000.

20944 (CEMR-MS—5) **Fuel-conservation efforts of Texas municipal.** Crouch, B.M. (Texas A and M Univ., College Station (USA). Center for Energy and Mineral Resources). May 1982. 32p. NTIS, PC A03/MF A01. Order Number DE83901223.

Based on survey findings, several conclusions can be made about how Texas police departments perceive and react to high and rising fuel costs. Responses received from all departments indicated some programatic efforts to conserve fuel, which demonstrates that Texas police departments have dealt with and are concerned about the rising cost of fuel. However, the problem of meeting fuel bills was apparently not a paralyzing one in 1981. For example, only about one in five departments claimed that fuel costs were second only to salaries in their budgets. In addition, although some departments have been relying on the more popular conservation plans for years, the majority had instituted such plans within two or three years. Among the most frequently used programs, two clusters of program choices appear. The first cluster includes more frequent tune-ups, increased maintenance, and reminders to offiers to conserve fuel. The second cluster includes shutting-off engines at given intervals, regular use of fixed position patrol, and reminders to officers to conserve fuel.

20945 (CONF-820128—4) **Sketch planning model for urban transportation policy analysis.** Kaplan, M.P.; Gur, Y.; Vyas, A.D. (Argonne National Lab., IL (USA)). Jan 1982. Contract W-31-109-ENG-38. 12p. NTIS, PC A02/MF A01. Order Number DE83007606.

From 61. annual meeting of the Transportation Research Board; Washington, DC, USA (18 Jan 1982).

The Urban Transportation Policy Analysis Process (UTPAP) is described. UTPAP was developed as a sketch planning analysis tool for the Technology Assessment of Productive Conservation in Urban Transportation (TAPCUT). TAPCUT was a comprehensive study of the potential environmental, health, and public safety impacts of various alternative productive urban transportation energy conservation strategies. Productive conservation strategies encourage energy conservation without disrupting the economy or life-style. The strategies that were analyzed reflected alternative national investment in infrastructure and technology and regulatory policies. The UTPAP is a sketch planning model package that incorporates state-of-the-art, household based, disaggregate travel demand models for mode and destination choice with detailed specification of automobile technologies. It is useful in analyzing both the short and long term implications of city specific transportation planning policies, providing summaries of transportation, fuel consumption, air quality, and public health and safety impacts. Stratified by both type of household and geographic area of occurrence, these impact measures are valuable in assessing the social equity of transportation policy impacts. Preliminary sensitivity analysis indicated that non-work travel was more responsive to price and level-of-service (LOS) change than work travel.

20946 (CONF-820128—5) **Economic impacts of petroleum shortages and the implications for the freight-transportation industry.** Johnson, L.R.; Knorr, R.E.; Saricks, C.L.; Mendiratta, V.B. (Argonne National Lab., IL (USA)). Jan 1982. Contract W-31-109-ENG-38. 29p. NTIS, PC A03/MF A01. Order Number DE83007604.

From 61. annual meeting of the Transportation Research Board; Washington, DC, USA (18 Jan 1982).

The major economic impacts that result from petroleum-supply interruptions and the subsequent effects on the demand for freight transportation are described. This analysis involved a simulation of the effects of three different fuel-supply shortfalls on intercity freight transportation. The research included the use of three economic and transportation models to simulate the economic impacts of oil shortfalls and the resulting change in freight-transportation demand as expressed in tons shipped, ton-miles of travel, and fuel use. Economic effects are discussed for a base case and then for a 7%, 14%, and 23% petroleum shortfall. The demand for freight transportation is determined by the output of various commodity sectors which generate traffic for the truck, rail, water, air, and pipeline modes. The effects of various diesel-fuel-price levels are also examined. The analysis suggests that at low, or controlled, fuel prices the more significant impacts for freight movements will be the reduction in output in the bulk-commodity sectors, which are dominated by the waterway and rail modes. At high fuel prices (i.e., equilibrium levels), shipping is significantly decreased in all commodity sectors, but mode shifts are likely to occur from truck to rail, and even from rail to water in some corridors.

20947 **(CONF-820128—6) Energy-conservation strategies and their effects on travel demand.** Stuart, D.G.; LaBelle, S.J.; Kaplan, M.P.; Johnson, L.R. (Barton-Aschman Associates, Inc., Evanston, IL (USA)). Jan 1982. Contract W-31-109-ENG-38. 32p. NTIS, PC A03/MF A01. Order Number DE83007630.

From 61. annual meeting of the Transportation Research Board; Washington, DC, USA (18 Jan 1982).

The types of impact on urban travel demand which might be expected from two broad, multi-faceted energy-conservation strategies are described. Based on sketch planning travel demand modeling conducted for three case-study regions, and generalized extrapolation of these results to national totals, illustrative travel impact results are presented. Five different types of impact are considered: (1) mode choice by trip purpose (work vs. non-work); (2) variations in transit travel by city type; (3) vehicle miles of automobile travel, for work and non-work purposes; (4) variations in trips per capita and trip length, by purpose; and (5) distributional differences in terms of household income levels and location within urban areas (central city, suburban, exurban). The In-Place Policy, marked by a sharp rise in auto out-of-pocket costs, showed no increase in per capita auto travel by 2000, while lowering aggregate energy consumption. The Individual Travel Policy, which lowered auto operation cost relative to In-Place by improvements to auto fuel economy achieved noticeable energy savings with negligible impact on choice of travel mode. The Group Travel Policy, on the other hand, significantly altered mode choice and saved transportation energy in this way. Significant improvements in transit service and strong automobile travel disincentives yielded dramatic shifts to group travel modes for non-work travel. Work travel mode choice was affected to a lesser extent, with increases of 30 to 40% in transit and shared ride mode splits.

20948 **(MIRA—82/12) Motor vehicle energy usage: a literature survey up to the end of 1974.** Shields, M.J.; Robinson, M.S. (Motor Industry Research Association, Nuneaton (UK)). May 1978. 24p. NTIS PC$9.00.

In order to estimate potential automotive energy savings, a literature survey, together with some elementary analysis of data, was carried out. Despite the necessarily restricted nature of the survey and analysis, and some inconsistencies in published data, it is possible to predict that not less than 85% of all potential energy savings will be made through reductions in vehicle fuel consumption, and the cash savings to the national economy resulting from this reduction in automotive energy demand will be of the order of 100M pounds per annum.

20949 **(N—82-25181) Sideslip indication system as a fuel saving aid in jet transport aircraFt operation.** Horst, D. (Lufthansa G.m.b.H., Hamburg (Germany, F.R.)). Nov 1981. 29p. NTIS, PC A20/MF A01.

In DFVLR Proc. of the 11th Symp. on Aircraft Integrated Data Systems p 247-275 (SEE N82-25171 16-01).

The relationship between sideslip angle heading constant, and roll angle is outlined and a sideslip sensor is described. A conical pressure sensing probe extends through the fuselage perpendicular to the local air flow. Unequal pressure arising from sideslip causes two paddle blades to rotate the probe until pressure on each paddle is equal, i.e., until the probe is realigned with the airstream. During rotation, output elements attached to the probe are also rotated, providing electrical signals proportional to sideslip angle to an indicator. Tests on an A-300 Airbus show that avoiding sideslip cuts fuel consumption by 0.2%.

20950 **(N—8228341) Electric propulsion.** (Jet Propulsion Lab., Pasadena, CA (USA)). Feb 1982. 7p. NTIS, PC A18/MF A01.

An alternative propulsion subsystem for MSAT is presented which has a potential of reducing the satellite weight by more than 15%. The characteristics of pulsed plasma and ion engines are described and used to estimate of the mass of the propellant and thrusters for attitude control and stationkeeping functions for MSAT. Preliminary estimates indicate that the electric propulsion systems could also replace the large momentum wheels necessary to counteract the solar pressure. However, the fine pointing wheels would be retained. Estimates also show that either electric propulsion system can save approximately 18% to 20% of the initial 4,000 kg mass. The issues that require further experimentation are mentioned.

20951 **(NASA-CR—3220) Selected advanced aerodynamic and active control concepts development.** (Boeing Co., Seattle, WA (USA)). Jan 1980. 56p. NTIS, PC A04/MF A01.

NASA REFS.

A summary is presented of results obtained during analysis, design and test activities on six selected technical tasks directed at exploratory improvement of fuel efficiency for new and derivative transports. The work included investigations into the potential offered by natural laminar flow, improved surface coatings and advanced high lift concepts. Similar investigations covering optimum low-energy flight path control, integrated application of active controls and evaluation of primary flight control systems reliability and maintenance are also summarized. Recommendations are included for future work needed to exploit potential advancements.

20952 **(NASA-CR—159097) Accelerated development and flight evaluation of active controls concepts for subsonic transport aircraft. Volume 1: load alleviation/extended span development and flight tests. Final report.** Johnston, J.F. (Lockheed-California Co., Burbank (USA)). Sep 1979. 261p. NTIS, PC A12/MF A01.

Active wing load alleviation to extend the wing span by 5.8 percent, giving a 3 percent reduction in cruise drag is covered. The active wing load alleviation used symmetric motions of the outboard ailerons for maneuver load control (MLC) and elastic mode suppression (EMS), and stabilizer motions for gust load alleviation (GLA). Slow maneuvers verified the MLC, and open and closed-loop flight frequency response tests verified the aircraft dynamic response to symmetric aileron and stabilizer drives as well as the active system performance. Flight tests in turbulence verified the effectiveness of the active controls in reducing gust-induced wing loads. It is concluded that active wing load alleviation/extended span is proven in the L-1011 and is ready for application to airline service it is a very practical way to obtain the increased efficiency of a higher aspect ratio wing with minimum structural impact.

20953 **(NASA-Facts—94/8-81) Aerodynamics/ACEE: aircraft energy efficiency.** (National Aeronautics and Space Administration, Washington, DC (USA)). 1981. 8p. NTIS, PC A02/MF A01.

An overview is presented of a 10 year program managed by NASA which seeks to make possible the most efficient use of energy for aircraft propulsion and lift as well as provide a technology that can be used by U.S. manufacturers of air transports and engines. Supercritical wings, winglets, vortex drag reduction, high lift, active control, laminar flow control, and aerodynamics by computer are among the topics discussed. Wind tunnel models in flight verification of advanced technology, and the design, construction and testing of various aircraft structures are also described.

20954 **(NP—3901121) Preparing for possible motor-fuel shortages: a community planning guide, Grants, New Mexico.** (New Mexico Energy and Minerals Dept., Santa Fe (USA); New Mexico State Highway Dept., Santa Fe (USA)). Feb 1982. 106p. New Mexico Energy R & D Information Center, 117 Richmond Dr., NE, Albuquerque, NM 87106.

A practical approach is provided for the community of Grants, New Mexico, to respond to motor fuel supply disruptions. The following are included: overviews highlighting fuel supplies and government roles in emergency transportation planning; factors in contingency planning which include community profiles, needs, resources, and constraints; and the local emergency planning process. (MHR)

20955 **(NP—3901210) Preparing for possible motor-fuel shortages: a community planning guide, Taos, New Mexico.** (New Mexico Energy and Minerals Dept., Santa Fe (USA); New Mexico State Highway Dept., Santa Fe (USA)). Feb 1982. 104p. New Mexico Energy R & D Information Center, 117 Richmond Dr., NE, Albuquerque, NM 87106.

This guide is prepared to provide a practical approach for the community of Taos, New Mexico, to respond to fuel supply disruptions. The following are included: overviews highlighting fuel supplies and government roles in emergency transportation planning; factors in contingency planning which include community profiles, needs, resources, and constraints; and the local emergency planning process. (MHR)

20956 **(PB—82-253329) Energy consumption of an electric, a petrol and a diesel powered light goods vehicle in central london traffic. Final report for 1978.** Wood, R.A.; Downing, B.R.; Pearce, T.C. (Transport and Road Research Lab., Crowthorne (UK)). [nd]. 49p. NTIS, PC A03/MF A01.

The consumption of primary energy by diesel, petrol and electric versions of a light van was compared under high-density urban traffic conditions. The vehicles were driven repeatedly round a 10km route in Central London and measurements of fuel consumption, distance travelled and time were made for each route section. Multiple regression analysis established vehicle sensitivities to variations in average speed, payload, road type, regenerated energy (electric vehicle), kinetic energy, weather and driver. The diesel vehicle used primary energy more efficiently than either the petrol or the electric vehicle over the entire speed range observed, the ratio of energy consumption (diesel:petrol:electric) being 100:185:198 at the average speed during the experiment (17.58km/h). The petrol vehicle was more efficient than the electric over most of the speed range, but was less efficient at speeds below about 14km/h. It is concluded that the diesel vehicle is the most efficient for urban delivery duties.

20957 **(PB—82-255647) Power and energy measurement on Morgantown People Mover system. Final report Jul 80-Nov 81.** McConnell, R.L.; Kuniak, R.J. (West Virginia Univ., Morgantown (USA). Harley O. Staggers National Transportation Center). Dec 1981. 97p. NTIS, PC A05/MF A01.

The Morgantown People Mover (MPM) is one of the most technologically advanced automated ground transportation systems in the world. It is a fully automated guideway transit (AGT) system under complete computer control. There are 8.7 miles of single lane guideway with five passenger stations and two maintenance stations. The vehicles are powered from a 575 volt three phase power rail that runs immediately above the guide rail throughout the system. The overall objectives of this study were the measurement of the power to determine real time power demand by the vehicle; and the development of a load flow analysis on the power system with several vehicles operating. This study developed a system of measuring and recording power demand on the MPM system. Vehicle power demand profiles are presented for some sections of the guideway.

20958 **(PB—83-115378) Energy cost reduction study of the Washington Metropolitan Area Transit Authority metrorail system. volume 1: final report.** Uher, R.A.; Sathi, N.; Sathi, A. (Carnegie-Mellon Univ., Pittsburgh, PA (USA). Rail Systems Center). May 1982. 202p. NTIS, PC A10/MF A01.

The Washington Metropolitan Area Transit Authority (WMATA) has established a program for reducing its overall energy costs. The objectives of this two-volume study were to classify the energy used by Metrorail into its primary end uses, and to identify those energy conservation strategies that have the highest potential for reducing energy costs. Although support energy (energy used in passenger stations, office buildings, and maintenance shops) is considered in this investigation, the primary emphasis is on traction energy (running the trains in revenue operation). The study involved analyzing the present energy costs, developing cost-effective energy conservation strategies, simulating the energy cost savings associated with these strategies, recommending the appropriate strategies for implementation and outlining a program for executing the recommendations.

20959 **(PB—83-115386) Energy cost reduction study of the Washington Metropolitan Area Transit Authority metrorail system. volume 2: appendices. Final report.** Uher, R.A.; Sathi, N.; Sathi, A. (Carnegie-Mellon Univ., Pittsburgh, PA (USA). Rail Systems Center). May 1982. 268p. NTIS, PC A12/MF A01.

This study is the first time that the Energy Management Model (EMM), developed for the transit industry by the Rail Systems Center at Carnegie-Mellon University, was comprehensively applied to a rapid transit property. The application to Metrorail was verified by comparing the simulated results to actual data obtained from the Potomac Electric Power Company (PEPCO). The simulated results agree to within 3 percent of the actual energy consumption. Five energy conservation strategies were recommended for implementation based on high benefit and low cost, namely: coasting, catch-up operation, passenger load factor improvement, regeneration of braking energy, and passenger station lighting improvements.

20960 **(TVA/PUB—83/25) Transportation methods and costs for sawlogs, pulpwood bolts, and longwood.** (Tennessee Valley Authority, Norris (USA). Div. of Land and Forest Resources). Feb 1981. 39p. NTIS, PC A03/MF A01. Order Number DE83901164.

Travel speeds, average load volumes, and costs per mile were determined for 15 different trucking methods. Equations were developed to predict rail and barge transportation costs. Several photographs are provided for user association and correlation with the study results.

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REFER ALSO TO CITATION(S) 19575, 19577, 19636, 19640, 19645, 19685, 19686, 19686, 19760, 19944, 19956, 20900, 21003, 21007, 21092, 21855

20961 **(ANL—83-8) Fluidelastic instability in shell and tube heat exchangers: a framework for a prediction method.** Wambsganss, M.W.; Yang, C.I.; Halle, J. (Argonne National Lab., IL (USA)). Dec 1982. Contract W-31-109-ENG-38. 55p. NTIS, PC A04/MF A01. Order Number DE83007812.

A framework for a method to predict fluidelastic instability in heat exchanger tube bundles is presented. The method relies on a three-dimensional, cylindrical coordinate, thermal-hydraulic analysis code to obtain a representation of the three-dimensional flow distribution within the heat exchanger. With this information, local crossflow velocities corresponding to each tube in the exchanger are obtained by interpolation and resultant crossflow velocity distributions are computed. With a knowledge of the vibration mode shapes and frequencies, reduced effective crossflow velocities are then computed for each tube. A comparison with experimental results shows excellent agreement: the tubes with high values of predicted reduced effective crossflow velocity are the same tubes that first experience fluidelastic instability in the flow tests and vibrate most violently; also, the simulation correctly predicts that the tubes directly exposed to the flow from the inlet nozzle have a low potential for fluidelastic instability. Very good agreement is also shown in the comparison of the predicted reduced effective crossflow velocities with the critical value obtained from a design guide. In summary, the feasibility of developing a heat exchanger tube vibration prediction method, based on a computer simulation of flow distribution, is demonstrated. Such a method would have immediate application in design optimization. However, further development and evaluation are required.

20962 **(ANL/ENG—82-01) Conceptual study: potential energy savings based on reduction of pressure in the ANL-east central heating system.** Minkov, V.; Hirsch, P. (Argonne National Lab., IL (USA)). Sep 1982. Contract W-31-109-ENG-38. 250p. NTIS, PC A11/MF A01. Order Number DE83007984.

Retrofitting existing Central Heating Systems to deliver steam at lower pressure and where necessary retrofitting end users to perform satisfactorily at the lower pressure, is examined in terms of engineering approaches and economic effectiveness. In addition to investigating the savings obtainable through reduction of thermal and leakage losses, other energy conservation opportunities related to reduction of steam pressure are considered. The latter includes less boiler blowdown, less energy used pumping feedwater, less steam vented from the deaerator, reduced boiler maintenance and repair requirements, and cogeneration of electricity by steam or gas turbines. Methodology and practical recommendations are presented that, although related directly to Argonne, are applicable to other facilities. Energy savings are estimated as up to 10%, and payback period as in the range of two to four years.

20963 (ANL/NESC—854) TDIST3; community energy consumption analysis. Ebeling-Koning, D.B.; Golay, M.W. (Massachusetts Inst. of Tech., Cambridge (USA). Dept. of Nuclear Engineering). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048854.

Maxima of - 20 different building types 10 energy sources in the piping network 75 energy consumer groups. The piping network is restricted to parallel, counter-current flow supply, and equal diameter pipes.

The TDIST3 program performs an analysis of large integrated community total energy systems (TES) supplying thermal and electrical energy from one or more power stations. The program models the time-dependent energy demands of a group of representative building types, distributes the thermal demands within a thermal utility system (TUS), simulates the dynamic response of a group of power stations in meeting the TUS demands, and designs an optimal base-loaded (electrically) power plant and thermal energy storage reservoir combination. The capital cost of the TES is evaluated, also. The program was developed primarily to analyze thermal utility systems supplied with high temperature water (HTW) from more than one power plant. The TUS consists of a transmission loop and secondary loops with a heat exchanger linking each secondary loop to the transmission loop. The power stations electrical output supplies all community buildings and the HTW supplies the thermal demand of the buildings connected through the TUS, a piping network. Basic components of the TES model are one or more power stations connected to the transmission loop. These may be dual-purpose, producing electricity and HTW, or just heating plants producing HTW. A thermal storage reservoir is located at one power station. The secondary loops may have heating plants connected to them. The transmission loop delivers HTW to local districts; the secondary loops deliver the energy to the individual buildings in a district.IBM370; FORTRAN IV (G-level compiler); OS/370 MVT, Release 21.7; 280K bytes of memory, card-image input and printer output units.

20964 (CONF-810940—12) Application of thermal energy storage to process heat recovery, Phase III, heat exchanger evaluation. Katter, L.B. (Rocket Research Co., Redmond, WA (USA)). 1981. Contract W-7405-ENG-26. 5p. NTIS, PC A02/MF A01. Order Number DE82000166.

From Annual contractors' review meeting on thermal and chemical storage; Tysons Corner, VA, USA (16 Sep 1981).

The overall goals of the Phase III Heat Exchanger Evaluation are to develop data which will enable the design of a heat exchanger suitable for long-term continuous operation in the aluminum plant pollution control system environment and to assure that the installation of such a device will have no negative impact upon the existing processes. This heat exchanger's function is to recover reject process heat which can be stored and ultimately used as the heat source in a district heating system. A series of tests starting with small-scale experiments and expanding in magnitude to a production prototype is currently in process. The smallest scale testing is complete. Information gathered has been used to define a subscale heat exchanger. The subscale heat exchanger is currently being fabricated. Preparations for its installation are underway currently.

20965 (CONF-8204112—1) New concepts in hardware and processes to conserve oil and gas in industrial processes. Humphrey, J.L. (Argonne National Lab., IL (USA)). 5 Apr 1982. Contract W-31-109-ENG-38. 9p. NTIS (US Sales Only). Order Number DE83007716.

From 4. annual industrial energy conservation technology conference; Houston, TX, USA (6 Apr 1982).

A broad program to identify and evaluate new types of hardware and processes to conserve oil and gas in chemical plants and petroleum refineries has been completed. During this program, Argonne interacted with 130 industrial companies to help define and evaluate appropriate areas of technology. The initial step was to assemble a master list of technologies that promised to conserve oil and gas. These technologies were then screened on the basis of quantity of energy saved, capital and operating costs, industry attitude, market potential, and special barriers to implementation such as environmental issues and other special types of problems. One approach used to determine industry attitudes on technologies was to poll several key energy-conservation groups. These included the Gulf Coast Energy Society, Golden Triangle Energy Society, CMA Energy Committee, and the Energy Conservation Committee of the American Petroleum Institute. Some of the results of this program are summarized in terms of the following areas of technology: energy-efficient methods of separation, alternative fuels and feedstocks, recovery of low-level heat, and advanced concepts.

20966 (DOE/CS/40094—T1) Energy conservation in the poultry processing industry. Phase I. Final report, June 1977-July 1978. Combes, R.S. (Georgia Inst. of Tech., Atlanta (USA). Engineering Experiment Station). Sep 1978. Contract AS05-77CS40094. 83p. (CONS—5459-1). NTIS, PC A05/MF A01. Order Number DE83007494.

This research project, constitutes the first phase of a two-phase program to identify and demonstrate energy conservation opportunities in the US poultry processing industry. The Gold Kist, Inc. broiler processing plant located in Ellijay, Georgia was chosen as the demonstration plant, and the first phase research addresses the characterization and engineering analyses of energy consumption patterns at this plant; identification of energy conserving plant modifications; and design and economic analysis of the modifications for actual implementation at the plant.

20967 (DOE/CS/40094—T2) Energy conservation in the poultry-processing industry. Final report-processing industry. Combes, R.S.; Boykin, W.B. (Georgia Inst. of Tech., Atlanta (USA). Engineering Experiment Station). Mar 1980. Contract AS05-77CS40094. 180p. NTIS, PC A09/MF A01. Order Number DE83901504.

A research project was conducted to identify and demonstrate technology to reduce the quantity of energy required in processing poultry. Readily available industrial energy-conserving equipment components were installed in an operating plant. When combined with modified operational procedures, these systems improved plant energy efficiency by 10.5% during 1979 while operating less than the full year. The energy-conserving systems installed showed simple paybacks ranging from less than one to a maximum of seven years and, if operated year-round, can result in a 30% plant energy savings.

20968 (DOE/ET/13332—T2) Potential for industrial cogeneration development by 1990. Executive summary. (Resource Planning Associates, Inc., Cambridge, MA (USA)). 31 Jul 1981. Contract AT03-76ET13332. 37p. NTIS, PC A03/MF A01. Order Number DE83008422.

The study reported was to determine how much industrial cogeneration development would occur in the 1980s. The study focused on electrical cogeneration in five industries that constitute three-quarters of industrial steam demand - pulp and paper, chemicals, petroleum refining, steel, and food processing. Several different industrial cogenertion investment situations were considered. Only steam topping-cycle applications are considered. Further, the effect of utility and industry ownership on cogeneration development is considered. The estimated cogeneration investment under a base-case condition of no additional governmental action is described, and the additional investment resulting from selected new governmental actions to remove regulatory barriers are examined. (LEW)

20969 (DOE/ID/12162—T2) Co-fired oil and tire-derived fuel: waste-tire energy-reclamation project. (Eastern Products Corp., Andover, MA (USA)). Apr 1982. Contract FC07-80ID12162. 146p. NTIS, PC A07/MF A01. Order Number DE83007300.

Test results demonstrated that tire-derived fuel (TDF) can be co-fired with oil in a concentration of up to 16% of the Btu input to the boiler. Combustion efficiency was aproximately the same as when burning oil only. This efficiency was achieved without making any inlet air optimization adjustments. The data also showed that TFD could be co-fired with oil without air pollution equipment and met Massachusetts pollution standards with proper control of the underfired air supply. Problems with the feed system and the grate are discussed. (MHR)

20970 (DOE/ID/12163—T1) National-Standard Company waste-tire fluidized-bed-combustion boiler project. Final report. Kenney, R.; Joyce, J.F. (National-Standard Co., Niles, MI (USA)). 1981. Contract FC07-80ID12163. 324p. NTIS, PC A14/MF A01. Order Number DE83008108.

The objective of the work reported was to commercially demonstrate a fluidized bed combustion (F.B.C.) system that could convert waste tires into steam energy at a convenience level approximately that of oil or gas-fired boilers. In order to burn tires in a F.B.C. unit, the tires must first be chopped into a maximum size of four inches by four inches. A test program was conducted to determine performance and design criteria, which were used to specify a commercial scale steam generation demonstration unit. It was found that 100% of the heat of combustion available in tires can be released in a F.B.C. unit. Tires must be combusted at 775 +- 25°C to provide for fiberglass removal. Unburned carbon black along with fiberglass, zinc oxide, bed fines and scrap wire would have to be landfilled. Sulfur dioxide and nitrogen oxide emissions would be below the limits imposed by the Michigan Department of Natural Resources. Particulate emissions downstream of the cyclone would have to be limited by some system such as a bag house. A revised financial analysis showed that the investment required for the F.B.C. unit made the entire system uneconomical. Although the operating costs of the waste tire system was considerably less than that of gas or oil fired boilers, the large initial investment for the system made the payback period 12-18 years.

20971 (DOE/JPL—9950-691) Membrane separation technology in the 1980's. ECUT: Energy Conversion and Utilization Technology Program. Biocatalysis research activity. Final report. Lonsdale, H.K. (Bend Research, Inc., OR (USA)). Mar 1982. Contract AI01-81CS66001. 45p. NTIS, PC A03/MF A01. Order Number DE83007264.

The status of membrane technology is described, as well as directions of membrane research and development around the world. It is concluded that the greatest promise for future applications lies in the extension of current trends, i.e., the development of ultrathin and highly permselective membranes; the use of specific carriers to enhance permselectivity, and, under certain conditions, permit uphill diffusion; and the use of new engineering approaches to improve separation efficiency. An important role is also anticipated in the evolving biotechnology field and in solar energy conversion. Areas are cited where research in membrane processes is considered likely to provide a positive return. (LEW)

20972 (EUR—7621-DE) Energy revovery from waste, with special regard to the possibility of producing high-grade granulated insulating materials by swelling processes. Neumann, P. (Commission of the European Communities, Luxembourg). 1981. 93p. (In German). Available from the Commission of the European Communities, Luxembourg.

How far the energy contained in residues can be recovered and used for producing light ceramized fluxes is discussed. Raw materials considered are a) industrial waste, household refuse, sewage sludge, and municipal waste, b) tailings, washery dirt, and flotation waste, and c) various types of fly dust, mostly from collieries.

20973 (EUR—7657-EN) Design, construction and testing of a gas engine driven high temperature industrial heat pump. Kew, P.A. (Commission of the European Communities, Luxembourg). 1982. 53p. Available from Commission of the European Communities, Luxembourg.

A high temperature, gas engine-driven heat pump has been designed constructed and commissioned. Most components are commercially available, the main exception being the exhaust boiler. The other heat exchangers were custom designed. When a source of hot water at 80°C is available the system can produce saturated steam at 110°C in the heat pump condenser, the engine jacket and the exhaust boiler. The Primary Energy Ratio (PER) of the system operating at design condition is 1.50 and the heat pump is capable of delivering 333 kW to the sink while consuming 221 kW of gas; a performance closely corresponding to the design specification. Preliminary tests indicate that the lubricant and R114 are compatible in contact with the compressor, pipework and heat exchanger materials at the temperatures encountered in the heat pump. Longterm tests are necessary to confirm this.

20974 (NP—3901021) Heat pumps for air conditioning in animal shelters and for heating of buildings. Balg, J. (Bonn Univ. (Germany, F.R.). Landwirtschaftliche Fakultaet). 14 May 1980. 168p. (In German). NTIS (US Sales Only), PC A08/MF A01. Order Number DE83901021.

Thesis.

This paper investigates the possibilities of economical application of heat pumps to improve the shelter climate and to utilize the animals heat potential for the purpose of heating. In order to be able to take the various influencing factors into consideration and to assess them economically, a calculation model was developed which allows, by using EDP, to understand the various influencing factors importance simultaneously. The basis are functional relations between environment and the usefulness and the heating capacity of the animal which were taken from the relevant literature. Animals referred to in the investigation are fattened cattle, fattened pigs, and broilers. In order to optimize the monetary usefulness of the fattening the fodder utilization by the animals should be selected as a criterion of the efficiency of fattening.

20975 (PB—82-227596) An assessment of vapor compression heat pump technology and applications for industrial processes. Final report Nov 80-Feb 82. Kearney, D.W. (Insights West, Inc., Los Angeles, CA (USA)). Apr 1982. 228p. NTIS, PC A11/MF A01.

The current status and potential of vapor compression heat pump technology and applications for industry are assessed, with particular regard to the impact of this technology on natural gas utilization. Industrial applications were identified on a 4-digit SIC level for each of the generic types of closed and open cycle VCHP systems: temperature boosting, dehumidification, mechanical vapor recompression, and low pressure steam production.

20976 (PB—82-229014) Recovery of heat from exhaust air of spray driers in the dairy industry. Summary report (final). Jansen, A.; Steenbergen, A.E.; Bergers, W.W.A. (Commission of the European Communities, Luxembourg). [nd]. 100p. NTIS, PC AE05/MF E05.

Experiments are described in which low cost aluminum heat exchangers (finned heat-pipe and plate types) transfer heat from the exhaust to incoming fresh air. After 24 hours' operation, flow resistance was found to increase and efficiency to fall due to fouling of the exchangers by milk powder. The effects of powder and moisture concentrations on the extent of this fouling are investigated. The ease of cleaning accumulated milk powder from the two types of heat exchanger for reasons of hygiene and their thermodynamic performance in the drying plant are compared. Cost and energy assessments are presented.

20977 (PB—82-229741) Substituting power plant waste heat for on-farm heat requirements. Final report. Lomax, K.M.; Gray, R.J. (Delaware Univ., Newark (USA)). Mar 1982. 85p. NTIS, PC A05/MF A01.

This report presents an analysis of the use of waste heat in the form of warm water (40C) from electric generating stations as an economical energy supply for drying grain. The power plants in Maryland were compared for available grain production and the Vienna site was found to provide the largest potential supply of grain. A computer model (MAIN. FOR) was designed to evaluate waste heat as an energy source based on the amount of energy required for drying, the supply of energy available from waste heat, and the amount of travel permitted by substitution of the waste heat for the usual propane fuel.

20978 (PB—82-230731) Etude des possibilites de recuperation des chaleurs perdues dans les installations thermiques: application aux cokeries classiques (study of ways of recovering waste heat from heat consuming installations: applications to traditional coke ovens). Final report. Busso, R.H.; Tribodet, P. (Commission of the European Communities, Luxembourg). [nd]. 82p. NTIS, PC AE05/MF E05.

A scheme is put forward for recovering more than 10% of the energy consumed by the coking process (500 MJ or 140 kWh per ton of coke produced) for the production of superheated steam. Laboratory and industrial tests were undertaken to identify the factors involved in the study and in the design of heat exchangers for the following alternatives: the case of a pilot heat exchanger, installed at the discharge of a coke oven for verifying on a semi-industrial scale the relevant hypotheses; the case of a single full-scale industrial heat exchanger for a large battery of ovens and whose economics appear to be favorable.

20979 (PB—82-232513) Test evaluation of gasoline transfer vapor recovery systems. Hasselmann, D.E. (TRW, Inc., Redondo Beach, CA (USA)). Nov 1974. 243p. NTIS, PC A11/MF A01.

This report describes the results from tests of systems for collecting hydrocarbon vapors at automobile filling stations. The purpose of these tests was to develop test procedures for determining gasoline vapor emissions during transfer operations at service stations and to use these methods to evaluate five different vapor recovery systems. Two balanced and three secondary vapor recovery systems were tested.

20980 (PB—82-251976) Conversion of shale and slate wastes to glass and glass-ceramic products. Open file report 20 Oct 76-19 Sep 79. MacKenzie, J.D. (California Univ., Los Angeles (USA)). 20 Oct 1980. 33p. NTIS, PC A03/MF A01.

Experiments were conducted to convert spent oil shale, waste slate, and copper slag into glass and glass-ceramic products. Spent oil shale was easily melted at 1,300C and converted into glass wool for insulation application. Glass-ceramics were prepared by the use of domestic chrome ore as a nucleating agent. Waste slate from Vermont was readily melted when mixed with limestone. The resultant glass fibers were highly resistant to alkali attack. Iron metal was recovered from copper slags by the use of coal powder as a reducing agent in the molten slag. The lowering of the iron content resulted ina melt that was glass-forming. Combinations of spent oil shale and copper slag also yielded useful glass and glass ceramic compositions.

20981 (PB—82-252016) Development of substitutes for asbestos. Open file report 28 Sep 79-1 Apr 81. MacKenzie, J.D. (California Univ., Los Angeles (USA)). Nov 1981. 29p. NTIS, PC A03/MF A01.

Experiments were conducted to determine the feasibility of using waste slate and limestone as a substitute for asbestos when producing glass powders and fibers. Glasses were made from mixtures of Vermont slate and limestone. The alkali resistance of the glass powders and the glass fibers was superior to that of glass powders and glass fibers based on compositions containing large amounts of zirconia. Some of the present glass compositions have alkali-resistance almost as good as that of chrysotile asbestos. Because of the low cost, ready availability in the United States, low melting temperatures, and ease of rendering into glass fibers, waste slate and limestone can be considered as substitutes for asbestos for many cement-type applications.

20982 (PB—82-259631) Highway binder materials from cellulosic and related wastes. Final report. Butte, W.A.; Kohn, E.M.; Scheibel, E.G. (Suntech, Inc., Marcus Hook, PA (USA)). Dec 1980. 169p. NTIS, PC A08/MF A01.

The abundance of cellulosic-based wastes was reviewed by section of the country and type which includes: wood wastes, municipal wastes and manures. Of the most promising waste conversion processes now under consideration, pyrolysis, liquefaction, and hydrolysis were selected for preliminary laboratory screening. Model wastes for this study included several pyrolysis oils, paper, sawdust and dried cow manure. Distillate oils produced during wood waste pyrolysis (WPO) served best as precursors of products that approximated bitumens and highly viscous fluids.

20983 (PB—82-262783) Refractory properties of brick produced from beneficiated chrome-containing furnace linings. Report of investigations/1982. Petty, A.V. Jr. (Bureau of Mines, Tuscaloosa, AL (USA). Tuscaloosa Research Center). Jul 1982. 22p. NTIS, PC A02/MF A01.

In Bureau of Mines research on recycling chrome-containing refractory wastes, used refractories from argon-oxygen decarburization and electric steelmaking furnaces were beneficiated. By means of dry magnetic separation on minus 6-mesh crushed wastes, a concentrate was produced. After minor adjustments to the particle size distribution, full-size refractory brick were dry-pressed by a commercial producer and fired to 1,450 and 1,730C. Standard testing procedures were used to determine the cold-crushing strength, modulus of rupture at 25, 1,300, and 1,500C, hot load, thermal shock resistance, thermal expansion, and slag resistance. Optical and electron microscopy were used to determine grain-bonding mechanisms, and energy dispersive analysis of X-rays was used to determine elemental distribution. The test results indicate that the beneficiated material could be used to produce a refractory product suitable for moderate-temperature applications.

20984 (PB—83-108605) Development and demonstration of a reverse-osmosis energy-recovery device. Final report. Andeen, G.B.; Eid, J.C. (SRI International, Menlo Park, CA (USA)). Jun 1982. 44p. NTIS, PC A03/MF A01.

An energy-recovery device for a seawater reverse-osmosis (RO) system was designed, fabricated, and tested. The device, comprised of a valving system, uses waste streams from an RO system to drive a pump which, in turn, sends additional feed flows to the RO elements. Test data demonstrated that efficiencies exceeding 95% can be expected, and, hence, energy consumption in a seawater RO desalination system can be decreased by 50%. Further, conversion may be decreased from 30% in order that membrane life is extended, and the size of the main pump and prime mover can be reduced by 50%. The device was subjected to almost 1000 hours (175,000 cycles) of testing, simulating its operation in a 4800 gallon/day seawater system, producing an outlet pressure of over 850 lbs/sq-in. for an inlet pressure of 750 lbs/sq-in. The device demonstrated an ability to self-start and to be controlled. An analysis of value and costs suggested that the device would be available to systems as small as 10,000 gallons/day. The results of this work confirm that significant improvements in the energy and economic performance of seawater desalination systems can be achieved.

20985 (PB—83-110734) Technological response to environmental protection regulations and energy price/supply structure: a case study of chlorine/caustic soda manufacturing. Executive summary report 1 Jul 79-30 Jun 81. Iverstine, J.C.; Kinard, J.L.; Cudd, R.M. (Southeastern Louisiana Univ., Hammond (USA). Coll. of Business). Nov 1981. 21p. NTIS, PC A02/MF A01.

A study to assess the technological response of chlorine/caustic soda manufacturers to environment regulations and energy constraints is summarized. In order to pinpoint specific technological innovations in chlorine manufacturing resulting from energy and environmental issues, all aspects of the manufacturing process were investigated. In addition, information was compiled on production rates, energy sources, electricity price and consumption patterns, and other pertinent data. These data were gathered via personal interviews with corporate officials representing 92 percent of the total U.S. chlorine/caustic soda manufacturers. Equipment vendors were interviewed to obtain performance data, and secondary data were gathered from trade journals, trade associations, and the Chlorine Institute. An overview of the technology and a review of relevant research hypotheses with conclusions are presented. A comparison of three alternative technologies using the best demonstrated efficiencies indicates that excellent energy savings are currently available by adopting membrane cell technology in lieu of the use of mercury or diaphragm cells. From both environmental and energy perspectives, it was suggested that membrane technology should be considered strongly in capacity planning. Reviewer comments are appended to the final report.

20986 **(PB—83-111286) Introduction of sulfur into copper converter slags to produce copper matte. Report of investigations/1982.** Paige, J.I.; Anable, W.E. (Bureau of Mines, Albany, OR (USA). Albany Research Center). Aug 1982. 22p. NTIS, PC A02/MF A01.

The Bureau of Mines investigated a method to totally utilize copper converter slags without recycling them back through the matte smelting furnace. The research was directed toward (1) recovering the contained copper in converting slags by producing a recyclable copper-iron matte, (2) carbothermically reducing the slags to recover the iron, and (3) producing slag wool from the depleted slags. This report deals with the reduction of three industrial converting slags, containing 2.0 to 7.3 wt-pct Cu, in an 800-kVA electric arc furnace to produce a recyclable copper-iron matte.

20987 **(PB—83-117358) Evaluation of asphalt cement extraction and recovery methods. Final report Oct 80-Jun 82.** Carey, D.E.; Paul, H.R. (Louisiana Dept. of Transportation and Development, Baton Rouge (USA). Research and Development Section). Jul 1982. 53p. NTIS, PC A04/MF A01.

The quality of recovered asphalt cement is studied which may be attributable to the method used for extraction or to the Abson recovery. Variables of these procedures such as the time an asphalt cement was exposed to extraction solvent, the total quantity of asphalt cement recovered, the total quantity of extraction solvent, and both the type and quantity of fines in the extracted mix samples were isolated to determine their influence on tested asphalt cement properties. Also examined was the testing variation within one operator and between two operators.

20988 **(PNL—4499) Survey and analysis of federally developed technology.** Reed, J.E.; Conrad, J.L. (Energetics, Inc., Columbia, MD (USA)). Feb 1983. Contract AC06-76RL01830. 110p. NTIS, PC A06/MF A01. Order Number DE83008124.

The methodology and results of a test effort to determine whether there exist unexpected opportunities for the direct transfer of technologies from federal laboratories to industry are presented. Specifically, the latest results of six federal laboratories with potential application in the pulp and paper industry, particularly those results applicable to improving energy productivity, were evaluated, cataloged, and distributed to industry representatives to gauge their reaction. The principal methodological steps in this effort were the development of a taxonomy of the pulp and paper industry, identification of industry needs and laboratory capabilities, laboratory visits, review of technology findings with industry, and evaluation and compilation of industry responses.

20989 **(PNL—4592) Research options for the development of sensors to measure the thermal state of solid steel bodies. Draft final report.** Gaspar, T.A.; Lownie, H.W. Jr. (Battelle Columbus Labs., OH (USA)). May 1982. Contract AC06-76RL01830. 74p. NTIS, PC A04/MF A01. Order Number DE83007253.

The purpose of the study reported here is to assist Battelle's Pcacific Northwest Laboratory (PNL) in planning a research and development program to develop temperature sensors for metal and ceramic industries. This study focuses on sensors to measure internal temperatures within bodies of hot steel. A series of literature surveys, interviews, field visits, and meetings with steel-industry organizations was conducted in seeking answers to questions posed by PNL. These questions, with responses, are summarized.

20990 **High temperature sensor.** Tokarz, R.D. (to Dept. of Energy). US Patent 4,365,229. 21 Dec 1982. Filed date 29 Jan 1981. vp.

PAT-APPL-229421.

A high temperature sensor includes a pair of electrical conductors separated by a mass of electrical insulating material. The insulating material has a measurable resistivity within the sensor that changes in relation to the temperature of the insulating material within a high temperature range (1,000 to 2, 000 K). When required, the sensor can be encased with ceramic protective coating.

20991 **Control system to reduce the effects of friction in drive trains of continuous-path-positioning systems.** Green, W.L. (to Dept. of Energy). US Patent 4,345,194. 17 Aug 1982. Filed date 1 Dec 1980. vp.

PAT-APPL-212045.

An improved continuous-path-positioning servo-control system is provided for reducing the effects of friction arising at very low cutting speeds in the drive trains of numerically controlled cutting machines, and the like. The improvement comprises a feed forward network for altering the gain of the servo-control loop at low positioning velocities to prevent stick-slip movement of the cutting tool holder being positioned by the control system. The feed forward network shunts conventional lag-compensators in the control loop, or loops, so that the error signal used for positioning varies linearly when the value is small, but being limited for larger values. Thus, at higher positioning speeds there is little effect of the added component upon the control being achieved.

20992 **(PB—82-240508) Possibilities of energy recovery and integrated energy supply of foundries.** Pautz, J. (Elektowaerme-Inst. e.V., Essen (Germany, F.R.)). Jul 1982. Translation of Trans. of unidentified German mono. 40p. NTIS, PC A03/MF A01.

The possibilities of energy recovery and an integrated energy supply of foundry operations which are equipped with arc furnaces are reported. The basis for these considerations are the heat balances of arc furnaces with conventional fp-lining and with water-cooled lining. It is shown that with the usual design of the cooling water loops, the systems for heating utility water and for heating buildings and halls, which are possible for induction furnaces and also applicable to arc furnaces. Furthermore, the possibility is pointed out of improving the economy of scrap-drying systems by preheating the combustion air. Finally, under the presupposition of a transition to pressurized water or evaporation cooling, possibilities are indicated for steam generation to feed into remote heating networks or operational steam networks, or to support steam generating systems by preheating the boiler feedwater.

20993 **(PB—82-213778) Energy production from waste heat by means of elastomers or memory metals.** Ljung, L. (Styrelsen foer Teknisk Utveckling, Stockholm (Sweden)). May 1982. Translation of unidentified Swedish mono., n.p., May 80. See also N81-21551. (STU—79-6394). 58p. NTIS, PC A04/MF A01.

Results are given of an examination of the possibility of energy production from waste heat with memory metals or elastomers. A primary concern has been to present a general description of the thermodynamic limitations on extracting the energy content of waste heat. Thus, the main part of the study deals with efficiency in various conversion processes including ideal processes, conventional conversion processes such as the Rankine cycle, and unconventional processes. The unconventional conversion process treated are those which utilize memory metals, elastomers, or ferromagnetism. The results could also be applied to other types of conversion processes.

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REFER ALSO TO CITATION(S) 20018, 20127, 20738, 20944, 20969, 20982

20994 (ANL/NESC—911R) DESA; district energy system cost energy model. Morofsky, E.L.; Verma, V. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048911.

Maxima of - 300 network nodes (includes buildings, branch points, and plants) 3 plants 30 years project life.

DESA (District Energy System Analysis) is a computerized design and cost energy accounting model that facilitates analysis of alternative methods of providing heating, cooling, and electrical power generation to urban areas. The model will develop the dollar and energy costs of a proposed system from specified demand load configuration of the system, the location and type of central plant, and certain financial assumptions. Comparisons are based on present value dollar costs for construction and operation over the life cycle of a system and the number of energy units consumed in the creation and operation of the energy supply systems. DESA is intended for application at the feasibility stage. The model permits selection of alternative energy sources to produce heating, cooling, and electrical power generation, and can provide cost and service comparisons for alternative development plans. Sources can include oil, gas, or coal, refuse through incineration or pyrolysis, and waste heat. The fuel selected is burned to heat water or produce steam, which can be used to run turbines that generate electricity, drive centrifugal chillers for cooling services, or simply to provide heating services. In cases where electrical generation is chosen as an option, the waste heat produced in the generation process can be used to provide buildings with heating and cooling (absorption) through either hot water or steam.IBM370,303x; FORTRAN IV; OS/370; Each of the seven DESA modules can execute in 140K bytes of memory.

20995 (BMFT-FB-T—80-109) Energy consumption analysis and comparative study of the operational results from heat pump plants. Final Report, Oct. 1979. Mueller, P.; Bewer, B.; Klaus, H.; Sander, W.; Wirthwein, H.J.G. (Vereinigte Elektrizitaetswerke Westfalen A.G. (VEW), Dortmund (Germany, F.R.)). Dec 1980. 240p. (In several languages). NTIS, PC A11/MF A01.

Electric energy consumption with inclusion of the electricity consumption of the supplementary and auxiliary equipment is considered. Costs are divided into plant costs for heat pumps, heating systems and auxiliary equipment, installation costs for heat pumps, heating systems and auxiliary equipment, operating costs and maintenance costs. Specific energy consumption and cost statements were determined. Operational experiences were reviewed and the energetic operational behavior, including supplementary and auxiliary equipment for a random test of plants, is discussed. (ESA)

20996 (CONF-820627—13) Urban air-quality impacts of district-heating development. Blaney, B.L.; Levine, E.P. (Environmental Protection Agency, Cincinnati, OH (USA). Industrial Environmental Research Lab.; Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 25p. NTIS, PC A02/MF A01. Order Number DE83007609.

From 75. annual meeting on the Air Pollution Control Association; New Orleans, LA, USA (20 Jun 1982).

The major factors that influence the city-wide annual average air-quality impacts of district-heating development are evaluated. The analysis is based on previous case studies of the environmental impacts of district heating and on emissions inventories for different energy-conversion sources and for metropolitan areas. The principal factors which affect the air-quality impacts of district-heating development are source stack height and pollution controls, fuel type, location of displaced space heating sources and the extent to which these displaced sources contributed to fuel-combustion emissions in urban areas. It is shown that district heating development may significantly improve city-wide sulfur dioxide pollution concentrations, but will have little effect on total suspended particulates. The degree of impact on nitrogen dioxide concentrations appears to lie between these two extremes. Generally, incremental emissions attributable to district-heating sources will not greatly increase city-wide annual average pollution concentrations because these sources centralize emissions in tall stacks. However, if the district-heating system is powered by numerous small- or medium-sized sources with short-to-medium stack height, a significant degradation in air quality may occur.

20997 (CONF-830213—1) Wastewater reclamation and methane production using water hyacinth and anaerobic digestion. Chynoweth, D.P.; Dolenc, D.A.; Schwegler, B.; Reddy, K.R. (Institute of Gas Technology, Chicago, IL (USA)). 1983. 13p. Institute of Gas Technology, 3424 South State Street, IIT Center, Chicago, IL 60616.

From 10. energy technology conference; Washington, DC, USA (28 Feb 1983).

Research reported here supports the conclusion that water hyacinth ponds are effective in the secondary treatment of domestic wastewater and under these conditions exhibited an average growth yield of 60 dry tons/ha-yr. However, treatment efficiencies and growth yields vary significantly in response to factors which include: (1) of nutrients in the pond influent; (2) residence times and water depth; (3) cultural techniques such as plant density and harvest frequency; (4) environmental conditions such as temperature, frost, etc.; and (5) insect infestation. These variables are under more intense study using smaller scale experiments. The results of these studies will be employed to determine optimum conditions for operation of the larger ponds. Work thus far completed on the anaerobic digestion of hyacinth and sludge has provided information on feed properties, feed biodegradabilities, digestion efficiencies under conventional digestion, nutritional balance, and the effects of blend constituents on methane yield and production rate. It is known that these feeds can be digested without external nutrient addition or pH control. The kinetics and efficiencies are comparable to those of other biomass or waste feeds; in fact, the yield from primary sludge is the highest we have seen reported for particulate feeds. Two conventional digester designs are currently exhibiting a significant increase in feed conversion to methane. Future laboratory research will continue to focus on advanced digestion and pretreatment for improvement of conversion efficiencies and net energy production. This will be complemented by operation of a larger scale experimental test unit.

20998 (CONF-8210126—1) Anaerobic sludge digestion with a biocatalytic additive. Ghosh, S.; Henry, M.P.; Fedde, P.A. (Institute of Gas Technology, Chicago, IL (USA); Texas Gas Transmission Corp., Owensboro, KY (USA)). 1982. 25p. Inst. of Gas Tech., 3424 South State Street, IIT Center, Chicago, IL 60616.

From 55. annual conference on water pollution control; St. Louis, MO, USA (3 Oct 1982).

The objective of this research was to evaluate the effects of a lactobacillus additive an anaerobic sludge digestion under normal, variable, and overload operating conditions. The additive was a whey fermentation product of an acid-tolerant strain of Lactobacillus acidophilus fortified with $CaCO_3$, $(NH_4)_2HPO_4$, ferrous lactate, and lactic acid. The lactobacillus additive is multifunctional in nature and provides growth factors, metabolic intermediates, and enzymes needed for substrate degradation and cellular synthesis. The experimental work consisted of several pairs of parallel mesophilic (35°C) digestion runs (control and test) conducted in five experimental phases. Baseline runs without the additive showed that the two experimental digesters had the same methane content, gas production rate (GPR), and ethane yield. The effect of the additive was to increase methane yield and GPR by about 5% (which was statistically significant) during digester operation at a loading rate (LR) of 3.2 kg VS/m^3-day and a hydraulic retention time (HRT) of 14 days. Data collected from the various experimental phases showed that the biochemical additive increased methane yield, gas production rate, and VS reduction, and decreased volatile acids accumulation. In addition, it enhanced digester buffer capacity and improved the fertilizer value and dewatering characteristics of the digested residue.

20999 (DOE/RA/50314—1) I-95 Sanitary-Landfill gas recovery and utilization feasibility study. (District of Columbia Dept. of Environmental Services, Washington, DC (USA)). Feb 1983. Contract FG01-80RA50314. 169p. NTIS, PC A08/MF A01. Order Number DE83006934.

This feasibility study was designed to determine the viability of a landfill gas recovery (LFG) recovery and utilization system at the I-95 Sanitary Landfill in Lorton, Virginia. Specific objectives included estimating the quantity and quality of recoverable LFG, evaluating alternatives for LFG use, developing a phased LFG recovery program, and assessing the environmental, health, safety, and socio-economic impacts of such a program.

21000 **(DOE/RA/50377—3) Cogeneration energy-recovery facility feasibility study: environmental rport.** (Nashville Electric Service, TN (USA)). Feb 1983. Contract FG01-80RA50377. 56p. NTIS, PC A04/MF A01. Order Number DE83008164.

Analyses are given of the impacts on the broad environment that will result from the construction and operation of the Nashville Electric Service Cogeneration Energy Recovery facility (NES CERF). Analyses are presented for water, waste-water, air and solid waste environmental impacts, as well as safety, health and socioeconomic considerations. The environmental, safety, health and socioeconomic impacts of the project will be minimal particularly when the positive secondary energy and landfill impacts are considered. All legal and administrative demands resulting from the proposed construction have and will be met. The time frame required to obtain necessary environmental permits will not require an extension of the construction schedule set up for the project. Based on the analysis, the following recommendations can be made: owner should monitor the CERF environmental responses and output as necessary in order to keep all environmental, safety, health and socioeconomic impacts at satisfactory levels; owner management should remain abreast of legislative developments in the areas of water, air and solid waste, in order to anticipate any necessary changes in procedures and operations; and frameworks should be set up to insure and maintain employee safety and operational training at peak levels.

21001 **(NYSERDA—81-30) Radisson community heating systems: technical and economic comparison of options. Final report.** Lester, W.A.; Becker, R.D.; Funnell, J.H.; Cardinal, R.A. (O'Brien and Gere Engineers, Inc., Syracuse, NY (USA)). Dec 1981. 130p. New York State Energy Research and Development Authority, Two Rockefeller Plaza, Albany, NY 12223.

The study reported was conducted to evaluate water source community heat pump systems for possible installation to serve a number of homes which are to be constructed in the northeast section of Radisson, New York. Although specific sites and facilities have been evaluated, it is the intent of this study to be site specific only to the extent of climatic conditions. In other words, the results of this study should apply to any area with similar climate.

21002 **(NYSERDA—82-24) Methanol from landfill gas: technology and economics. Final report.** Hollomon, J.B. (International Harvester Co., Burr Ridge, IL (USA)). Dec 1982. 363p. New York State Energy Research and Development Authority, Two Rockefeller Plaza, Albany, NY 12223.

The production of methyl alcohol from methane evolved from sanitary landfills was investigated. The approach considered involves pretreatment and steam reforming to produce carbon monoxide and hydrogen, followed by thermochemical methanol synthesis based on conventional technology. A modular packaged plant concept would limit capital costs while providing for small size consistent with resource availability. The assessment consisted of detailed conceptual process design of an integrated facility, cost estimates and financial analysis, laboratory investigation of the composition of gas from the Fresh Kills landfill on Staten Island, market analysis of potential sites and methanol uses in New York State, and a discussion of public policy options. Results include conditions under which operation could be economical as well as strategies for introducing product methanol into the marketplace. Extensive chemical data produced in the course of the project characterize the contaminants that might affect process performance or economics. Policies that the state government could adopt to promote investment in landfill gas to methanol conversion are also identified.

21003 **(ORNL/TM—6830) District heating/cogeneration application studies for the Minneapolis-St. Paul area. Summary of Twin Cities case study and the St. Paul Project.** Karnitz, M.A.; Kolb, J.O. (Oak Ridge National Lab., TN (USA)). Feb 1983. Contract W-7405-ENG-26. 88p. NTIS, PC A05/MF A01. Order Number DE83008170.

A site-specific study was conducted to evaluate the feasibility of a large, cogeneration/district-heating system for US cities. The MInneapolis-St. Paul area was chosen as the site for a case study of a modern hot-water district-heating system. The first phase of the work was a conceptual feasibility study for the entire metropolitan region. The effort concentrated on assessing the heat loads and heat sources that could be connected over a 20-year period. This study phase set the framework for the overall potential for district heating in the region and was the stimulus for the sceond phase, the St. Paul district-heating demonstration project. The St. P District-Heating Development Company is planning to build the first modern hot-water district-heating system in a major US city.

21004 **(ORNL/TM—6830/P7) District heating/cogeneration application studies for the Minneapolis-St. Paul area. Building conversion costs and economics for the St. Paul hot water district heating market.** Kolb, J.O.; Teichman, K. (Oak Ridge National Lab., TN (USA)). Feb 1983. Contract W-7405-ENG-26. 72p. NTIS PC E03/MF A01. Order Number DE83008171.

Includes 1 sheet of 24x reduction microfiche.

A study of methods and costs for converting buildings' heating systems to a hot water supply in St. Paul, Minnesota is summarized. The general characteristics of an economic analysis are presented for a typical building with a current energy source of either steam district heat or natural gas. Building heating systems were classified by the distribution media - steam, hot water, and air - and also by the heating system configuration - perimeter heating and/or air ventilation heating. Conversion cost results for hot water distribution system buildings average $40/kW(t) of demand, as opposed to $200/kW(t) for the steam perimeter heating systems. The economic analysis results were characterized by the payback period. Payback periods are found to be longer for current steam users than for natural gas customers. (LEW)

21005 **(ORNL/TM—6830/P10-Vol.1) District heating/cogeneration application studies for the Minneapolis-St. Paul area. Market assessment and economic analysis of the St. Paul district heating system.** Nyman, H.O.; Kolb, J.O.; Krautbauer, M. (Oak Ridge National Lab., TN (USA)). Feb 1983. Contract W-7405-ENG-26. 150p. NTIS PC E06/MF A01. Order Number DE83008303.

The goals of the St. Paul District Heating Demonstration Project are: (1) to assess the detailed economic feasibility of a cogeneration, hot water district heating system servicing the commercial core area of St. Paul, Minnesota, and (2) to develop an implementation plan for financing and construction of the first phase of the system over a four- to five-year time span. The results of the economic feasibility assessment and the implementation plan are presented. The economic assessment is based on engineering studies of the detailed heat load and market definition, building conversion methods and costs, St. Paul area heat sources, and the conceptual design of the piping distribution system. Extensive use of Swedish hot water district heating technology and experience with cogeneration heat sources is incorporated in the design to minimize capital and operating costs. The heat load survey determined a 300-MW(t) total heat load in the initial market area. The market is composed of over 300 buildings, including four major hospitals and the State Capitol complex. A significant fraction (50%) of the buildings have internal steam distribution systems, many of which are old and in need of repair. Building conversion studies disclosed a wide range of costs for upgrading and connection of a 250°F hot water supply system. Costs were estimated for the piping systems, peaking heat sources, and building conversion from project studies. The results of the preliminary economic feasibility study established the business plan and key project requirements leading to the construction of a $44 million hot water district heating system in St. Paul.

21006 (PB—82-218488) **Environmental services: energy conservation in wastewater treatment (a case study from the urban consortium).** (Public Technology, Inc., Washington, DC (USA)). 1980. 6p. NTIS, PC A02/MF A01.

This pamphlet summarizes efforts on the Federal and local levels to promote energy conservation while maintaining or improving water quality. Some municipalities have been implementing energy conservation strategies in their initial treatment plant designs. Such a case study is described--the Southerly Wastewater Treatment Plant of Cleveland, Ohio. This energy conservation program uses incineration to provide steam for sludge processing, with heat recovery, from clarifier skimmings and sludge. Building heat is supplied in part by the use of heat pumps and energy wheels--devices which transfer building exhaust heat to incoming ventilation air. The heat pumps use the treated wastewater discharge from the plant. The pumps will heat eight buildings with an estimated equivalent savings of 265,000 gallons of fuel oil annually. It is concluded that the program is both workable and cost-effective.

21007 (PB—82-260415) **Waste products in Missouri with potential highway application. Missouri cooperative highway research program (final).** (Missouri State Highway Dept., Jefferson City (USA). Div. of Materials and Research). Apr 1982. 70p. NTIS, PC A04/MF A01.

A statewide survey to locate solid waste products having potential for highway applications was conducted during 1981. The survey inventory includes 305 separate entries representing some 80 million tons of waste material currently accumulating at an annual rate of about 5 million tons. Due to the State being a prime source of metal ore mining and smeltering, vast tonnages of mine tailings have accumulated. Also, considerable tonnages of electric utility waste products continue to accumulate in the form of fly ash, dry bottom boiler ash, and wet bottom boiler slag. Possible uses for each waste material product are cited. From the summarized inventory, certain waste products were selected that appear to warrant further evaluation.

21008 (WSUN—139) **Handbook on solar energy and energy conservation for Arizona local governments.** Osborn, D.E.; Pfister, S.; Harper, D.; English, T.; Biddle, W.; Smith, D. (Arizona Energy Office, Phoenix (USA); Western SUN of Arizona, Phoenix (USA)). Fal 1981. 194p. NTIS, PC A09/MF A01 - Arizona Energy Office, 1700 W. Washington, Phoenix AZ 85007. Order Number DE82903951.

Three Guidebooks comprise the Handbook. Guidebook 1 provides information for local leaders on how to initiate and develop a local energy program. Guidebook 2, Planning and Zoning for Solar Access, provides assistance to people involved in the development and operation of planning and zoning methods to provide local solar access protection. Guidebook 3, Incorporating Solar Energy Conservation into Local Codes, provides assistance to the key people involved in the development and operation of local building codes. The paths that 15 communities took in Arizona took in designing their energy plan are summarized. A case study of Tucson, Arizona emphasizing land use regulations and the use of solar energy is presented in two parts: Potential Barriers to the Use of Solar Energy in Tucson and Solar Planning Options for the City of Tuscon. (MCW)

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REFER ALSO TO CITATION(S) 20776, 20988

33 ADVANCED AUTOMOTIVE PROPULSION SYSTEMS

3301 Internal Combustion Engines

REFER ALSO TO CITATION(S) 21033

21009 (AD-A—115073/9) **Turbocharging of small internal combustion engine as a means of improving engine/application system fuel economy-further turbocharger improvements. Final report Oct 80-Feb 82.** Arvin, J.R. (Aerodyne, Dallas, TX (USA)). Apr 1982. 80p. NTIS, PC A05/MF A01.

Improvements to a small diesel engine turbocharger were made based on data gathered during a previous Army contract. The improved turbocharger was fabricated and tested on a small, four cylinder, 239 CID diesel engine. Engine dynamometer test data revealed a 2 to 9 percent reduction in fuel consumption at all points over the operating envelope. A turbocharger was operated for 1011 hours at speeds between 70000 and 78000 rpm without incident. The ball bearings were in excellent condition at the end of the test. A math model of the engine and turbocharger was generated. The model was used to estimate 13 Mode Federal Diesel Emissions Cycle, the LA4 driving cycle and the application of the variable area turbine nozzle (VATN) turbocharger to a diesel engine driven generator set. A recommendation was made to build a gen set demo unit. A fuel savings of 8 to 10 percent was estimated for a 30KW DED generator set.

21010 (AD-A—118819/2) **Efficiency improved turboprop. Technical memo.** Gearhart, W.S. (Pennsylvania State Univ., University Park (USA). Applied Research Lab.). 10 Jun 1982. 29p. NTIS, PC A03/MF A01.

Renewed attention has been focused on the efficiency of aircraft propulsion as the cost of fuel has risen. Studies conducted by NASA (1) to obtain fuel efficient aircraft have considered relatively highly-loaded turbo-prop systems. The disc loadings of these propellers are as much as four times higher than those on present turboprop aircraft. The higher disc loadings result in greater slipstream swirl and higher energy losses. Of primary importance is the radial distribution of the energy losses across the slipstream due to the tangential and axial velocities. This study presents the results of analysis defining the various sources of energy loss resulting from a swirling slipstream downstream of a propeller. Experimental data are presented demonstrating the presence of such losses and a propeller configuration discussed which offers improved propulsive performance when relatively highly-loaded propellers are employed.

21011 (DOE/AL/17575—T1) **Optical diagnostics for diesel-engine applications.** Sangiovanni, J.J.; Dobbs, G.M.; Bonczyk, P.A. (United Technologies Corp., East Hartford, CT (USA). Research Center). Jan 1983. Contract AC04-81AL17575. 72p. NTIS, PC A04/MF A01. Order Number DE83007201.

Investigations were conducted of the applicability and limitations of Coherent Anti-Stokes Raman Spectroscopy (CARS) and a combination of laser light extinction and Mie scattering, respectively, to measurements of thermometry and species concentrations and of particulate size and concentration in sooty combustion environments typical of diesel combustion processes. The experimental methods used, and the difficulties in discriminating between soot particles and fuel droplets when using these methods are discussed. CARS measurements were performed on a highly-sooting, gaseous-fueled, diffusion flame and a wick-fed, diesel-fueled flame with the objective of measuring the levels of laser-induced, soot-generated interferences. These results are used to assess the viability of CARS as a diagnostic technique for diesel combustion. Potential soot-generated interferences to CARS, identified in some early studies, were not observed. However, in the wick-fed, diesel-fueled flame there were regions of the flame in which gas breakdown could not be avoided. Under these conditions, the CARS signal was unobtainable using the high-spatial-resolution configuration. The atmospheric-pressure flames used in these model experiments are, of course, only partially successful in emulating diesel combustion. In assessing the potential use of CARS for routine diesel applications, a recommendation is made that similar investigations be carried out under conditions which simulate diesel conditions more closely by being at higher pressures; geometries which control the optical field intensities well enough to control breakdown should also be explored.

21012 (DOE/CS/56051—8) Status of alcohol fuels utilization technology for highway transportation: a 1981 perspective. Volume II. Compression-ignition engines. (Mueller Associates, Inc., Baltimore, MD (USA)). Nov 1982. Contract AC05-79CS56051. 129p. NTIS, PC A07/MF A01. Order Number DE83008127.

The current status of the technologies of alcohol utilization in highway transportation diesel engines is reviewed. The use of methanol, ethanol, and certain of their derivatives in diesel-engine-powered vehicles is treated in this volume. The results of engine, vehicle and fuels testing are summarized. The topics of fuel properties, power output, fuel consumption, thermal efficiency, ignition delay, rate of pressure rise, engine noise, operability, exhaust emissions, smoke, materials compatibility, engine wear, and safety are discussed based on the data available at this time. The status of the technology at the time of the last comprehensive survey (1978) is summarized and discussed. Significant advances made since that time are delineated, as are remaining information gaps and areas in which more extensive investigation is still needed.

21013 (DOE/NASA/0187—82/1) Support and power-plant documentation for the gas-turbine-powered-bus demonstration program. Final report, 1 January 1980-30 September 1981. Nigro, D.N.; Stewart, R.G.; Apple, S.A. (General Motors Corp., Indianapolis, IN (USA). Detroit Diesel Allison Div.). Mar 1982. Contract AI01-77CS51044. 187p. NTIS, PC A09/MF A01. Order Number DE83002880.

The operational experience obtained for the GT404-4 gas turbine engines in the Intercity and Intracity Bus Demonstration Programs is described for the period January 1980 through September 1981. Support for the engines and automatic transmissions involved in this program provided engineering and field service, spare parts and tools, training, and factory overhauls. The Greyhound (intercity) coaches accumulated 183,054 mi (294,595 km) and 5154 hr of total operation. The Baltimore Transit (intracity) coaches accumulated 40,567 mi (65,285 km) and 1840 hr of total operation. In service, the turbine-powered Greyhound and Transit coaches achieved approximately 25% and 40% lower fuel mileage, respectively, than did the production diesel-powered coaches. The gas turbine engine will require the advanced ceramic development currently being sponsored by the DOE and NASA to achieve fuel economy equivalent not only to that of today's diesel engines but also to the projected fuel economy of the advanced diesel engines of the 1990s. Sufficient experience was not achieved with the coaches prior to the start of service to identify and eliminate many of the problems associated with the startup of new equipment. Because of these problems, the mean miles between incident were unacceptably low. The future gas turbine system should be developed sufficiently to establish satisfactory durability prior to evaluation in revenue service. Commercialization of the gas turbine bus engine remains a viable goal for the future.

21014 (PB—82-230376) Estimated maintenance and repair requirements for coal-fired propulsion systems. Final report. Little, D.E.; Murtagh, M.M. (Sante Fe Corp., Alexandria, VA (USA)). Jun 1982. 117p. NTIS, PC A06/MF A01.

This study was directed toward identifying unique maintenance and repair requirements in terms of manpower and materials for coal-fired steam turbine propulsion plant ships. The method of approach included surveys of industrial and marine coal-fired plant operators and coal-firing equipment manufacturers to obtain a data base of manpower and material requirements for a range of plant sizes and operating scenarios. A national coal-fired plant was then developed and the maintenance data base adapted to the marine coal-fired system. From this information, required crew manpower was determined and compared to typical oil-fired systems and associated manpower availability evaluated. Material and contract manpower costs were assessed and parametric data developed to allow potential operators to estimate daily maintenance and repair costs.

21015 (PB—82-235854) Fuel economy and exhaust emissions characteristics of a diesel vehicle: results of the prototype Volkswagen 1.5-liter turbocharged rabbit tests. Final report. Walter, R.A.; Quayle, S.S.; Sturm, J.C. (Department of Transportation, Cambridge, MA (USA). Transportation Systems Center). Oct 1981. 85p. NTIS, PC A05/MF A01.

Tests were performed on a prototype Volkswagen (VW) Turbocharged (TC) Rabbit diesel vehicle on a chassis dynamometer. The vehicle was tested for fuel economy and emissions on the Urban Federal Test Procedure (FTP), Highway Fuel Economy Test (HFET), Congested Urban Expressway (CUE), and New York City Cycle (NYCC). Steady state measurements were performed at three speeds. Particulate measurements were completed at all test conditions. Approximately 250 grams of particulate matter were collected over the HFET cycle for inclusion in the Environmental Protection Agency Diesel Health Effects Research Program. During the urban cycle the vehicle obtained 45.7 mpg, with emission rates of 0.14, 0.89 and 1.07 grams per mile of HC, CO, and NOx, respectively. The Rabbit obtained 56.5 mpg during the HFET cycle.

21016 (PB—82-253048) Vehicle operating costs in the Caribbean: an experimental study of vehicle performance. Morosiuk, G.; Abaynayaka, S.W. (Transport and Road Research Lab., Crowthorne (UK)). [nd]. 29p. NTIS, PC A03/MF A01.

This report describes an experimental study of vehicle speed and fuel consumption undertaken in the Eastern Caribbean island of St Lucia. The study was designed to extend the range of the empirical relationships derived in an earlier study in Kenya which relate vehicle speed and fuel consumption to the geometric characteristics and surface condition of the road. The results of this study are compared with the relationships derived in the Kenya study and recommendations are made on the use of the two sets of relationships. A methodology has been evolved to provide vehicle speed estimating relationships which are applicable to physical and environmental conditions lying between the two sets of conditions encountered in Kenya and St Lucia.

21017 (PB—83-101139) Review and evaluation of automotive fuel conservation technologies. Final report. Siegel, H.M.; Schwarz, R.; Andon, J.; Kolars, G.; Gerstenberger, T. (South Coast Technology, Inc., Ann Arbor, MI (USA)). Dec 1981. 267p. NTIS, PC A12/MF A01.

To support the Office of Research and Development of the National Highway Traffic Safety Administration with focused studies in areas affecting automotive fuel economy and related safety issues, a series of in-depth studies were carried out: Fuel Consumption Estimates of Stratified Charge Rotary Engines Installed in Five Vehicles; Oldsmobile Omega X Body Baseline Weight Data; GM X Body Material Substitution Weight Reduction/Cost Effectiveness Study; Calspan RSV Restraint System Cost Study; FMVSS No. 208 Extension to Light Trucks, Vans, and MPV's - Cost Lead Time Study; Multipiece Rims for Trucks, Buses, and Trailers; Identifying Design Changes, Cost Impacts and Manufacturing Lead Times to Upgrade FMVSS 114 for Passenger Cars, Trucks, and MPV's; Ford Escort GL Baseline Weight Data.

21018 (PB—83-101147) Review and evaluation of automotive fuel conservation technologies. Volume I: summary. Final report Mar 79-Sep 81. Taylor, T. Jr. (Corporate-Tech Planning, Inc., Waltham, MA (USA)). Dec 1981. 89p. NTIS, PC A05/MF A01.

A series of research tasks were instituted to assess the impact of automotive technologies and the manufacturer's overall product plans on existing and future fuel economy requirements. Supported by NHTSA's Technology Assessment Division, this program provided analytical capabilities in the areas of automotive technology, manufacturing costs, and industry assessments. Specific subject areas of investigation include: potential fuel economy improvements from variable valve timing of internal combustion engines; effects of tire under inflation on fuel economy; reductions in engine friction; automotive applications of metal/plastic laminates as a substitute material; cost, weight and material analyses of a Ford F-150 light truck; design, cost and weight analyses of truck-trailer rear underride guards; the impact of FMVSS (seat belts) comfort and convenience on vehicle manufacturing; design modifications and manufacturing costs of child seat tether anchorages; and identification of auto manufacturer's technical progress in weight reduction through material substitution and component redesign.

21019 (PB—83-101154) Review and evaluation of automotive fuel conservation technologies. Volume II: appendix C. Final report Mar 79-Sep 81. Taylor, T. Jr. (Corporate-Tech Planning, Inc., Waltham, MA (USA)). Dec 1981. 177p. NTIS, PC A09/MF A01.

The Appendices of Volumes I and II contain reports on those subject areas not previously submitted under NTIS. These subjects are: effects of automobile tire pressure changes on fuel economy; weight reduction through material substitution and component redesign; and an alternate design for truck rear underride guard protection.

21020 (PB—83-112789) Noise reduction retrofit for a 'new look' GMC transit bus: service bulletin. Final report Apr 80-Nov 81. Kaye, M.C. (Tri-County Metropolitan Transportation District of Oregon, Portland (USA)). Nov 1981. 64p. NTIS, PC A04/MF A01.

This document gives instructions on how to apply a noise treatment to a contemporary city transit bus without extensive structural alteration. Prototype anti-noise treatments of two conventional transit motorbuses were tested: a Flexible 'New Look' and a GMC 'New Look' model. Baseline bus configuration, noise ratings, and performance benchmarks are presented for a GMC model T8H-5307A transit bus, powered by a Detroit Diesel 8V-71N engine. Earlier, a Flxible model 111DC-D061 was similarly treated using the same concepts and much of the same hardware. The results are almost identical, showing the wide range of treatment applicability. This report gives instructions as to how GMC 'New Look' model is retrofitted with a turbocharged 8V-71TAC engine and ancillary hardware. The instructions include the revision of the engine aspiration system for easier breathing, the lining of the engine compartment with an anti-noise blanket, and the silencing of the hiss of the compressed air system dryer.

3302 External Combustion Engines

21021 (DOE/NASA/0032—15) Automotive Stirling-Engine Development Program. Semiannual technical progress report, July 1-December 31, 1981. Ernst, W.; Piller, S.; Richey, A.; Simetkosky, M. (Mechanical Technology, Inc., Latham, NY (USA)). Sep 1982. Contract AI01-77CS51040. 85p. (NASA-CR—167907; MIT—82ASE248SA1). NTIS, PC A05/MF A01. Order Number DE83004802.

This is the first semiannual technical progress report prepared under the automotive Stirling Engine Development Program; it covers the fourteenth and fifteenth quarters of activity after award of the contract. Quarterly technical progress reports reported program activities from the first quarter through the thirteenth quarter; thereafter, reporting was changed to a semiannual format. This report summarizes activities performed on Mod I engine testing and test results, progress in manufacturing, assembling and testing of a Mod I engine in the United States, P-40 Stirling engine dynamometer and multifuels testing, analog/digital controls system testing, Stirling reference engine manufacturing and reduced size studies, components and subsystems, computer code development activities. The overall program philosophy is outlined, and data and results are presented.

3303 Electric-powered Systems

REFER ALSO TO CITATION(S) 20781

21022 (AD-A—115843/5) Nickel-zinc batteries for RPV applications. Final technical report 15 Nov 79-15 Aug 81. Dappert, D. (Eagle-Picher Co., Joplin, MO (USA)). Feb 1982. 161p. NTIS, PC A08/MF A01.

Final technical results are presented for a program dealing with the placement of nickel-zinc batteries in specific military applications, namely the BQM-34A and the PQM-102 Remotely Piloted Vehicles (RPV's). The nickel-zinc system was selected for these applications because RPV's demand a high quality secondary battery that offers a compromise between long life (calendar and cycle) and low weight and volume.

21023 (AD-A—118333/4) Baseline and verification tests of the Unique Mobility, Inc. Electrek 2+2. Final test report 8 Aug 80-29 May 81. Dowgiallo, E.J. Jr; Chapman, R.D. (Army Mobility Equipment Research and Development Center, Fort Belvoir, VA (USA)). Mar 1982. 127p. NTIS, PC A07/MF A01.

The Electrek 2+2 by Unique Mobility, Inc. is a custom-designed vehicle with a molded fiberglass and polycarbonate body. It was tested by the U.S. Army Mobility Equipment Research and Development Command (MERADCOM) at Fort Belvoir, Virginia, as part of the Department of Energy (DOE) project to characterize the state-of-the-art of electric vehicles. The vehicle is powered by 16 6-volt lead-acid batteries through a transistorized controller to a 32-hp modified shunt wound electric motor. It has 4-speed manual transmission and disc brakes in front with drum in the rear and is equipped with regenerative deceleration.

21024 (AD-A—118741/8) Verification test of the Battronic Truck Volta Electric Pickup. Report for Jul 80-Jan 81. Dowgiallo, E.J. Jr; Snellings, I.R.; Chapman, R.D. (Army Mobility Equipment Research and Development Center, Fort Belvoir, VA (USA)). Apr 1982. 40p. NTIS, PC A03/MF A01.

The Volta Pickup is an electric 1/2-ton truck manufactured by the Battronic Truck Co. It was tested by MERADCOM at Fort Belvoir, Virginia as part of a Department of Energy project to verify conformity to performance standards of electric vehicles. The verification test results are presented in this report. The Volta Pickup is powered by 24 6-V lead-acid batteries, has a 38 hp series wound d.c. motor, SCR chopper controller, regenerative braking, and a 2-speed Helical gear transmission.

21025 (AD-A—120057/5) Verification tests of the U.S. Electricar Corporation Lectric Leopard. Technical report 3 Aug-25 Sep 81. Dowgiallo, E.J. Jr; Snellings, I.R.; Chapman, R.D. (Army Mobility Equipment Research and Development Center, Fort Belvoir, VA (USA)). Apr 1982. 39p. NTIS, PC A03/MF A01.

The Lectric Leopard manufactured by U.S. Electricar Corporation was tested at MERADCOM as part of the Department of Energy project to verify conformity to performance standards of electric vehicles. The Leopard is a standard Fiat Strada sedan which has been converted to an electric vehicle. It is powered by 16 6-V batteries through a silicon-controlled rectifier (SCR) Controller to a 23-hp series-wound d.c. motor. It is equipped with a five-speed manual transmission, power-assisted disc brakes in the front and drum brakes in the rear. It is not equipped with regenerative braking.

21026 (CONF-810111—4) Social, institutional, and public-safety impacts of electric and hybrid vehicles. Singh, M.K. (Argonne National Lab., IL (USA)). 14 Jan 1981. Contract W-31-109-ENG-38. 21p. NTIS, PC A02/MF A01. Order Number DE83007782.

From Annual meeting of the Transportation Research Board; Washington, DC, USA (12 Jan 1981).

Assuming future EHV technology developments as expected under the DOE program and as described in this paper, the social, institutional and public safety impacts of EHVs can be summarized as follows. The social impacts of EHVs may be both beneficial and adverse. In particular, the range limitations of EVs and the time required for recharge will limit the mobility of the users. However in times of liquid fuel shortages, EHVs will enhance mobility. EHVs are expected to have little or no impact on many elements of the transportation infrastructure needed to support EHV penetration. However some aspects of that infrastructure will be impacted. For example, rapid conversion of auto production lines under high penetration may present problems, compensating taxes for the federal motor fuel tax lost will have to be approved, some utilities will have to increase their generating capacity and an EHV servicing network will have to be developed. All public safety concerns are expected to be mitigated by standards promulgated as EHV commercialization proceeds. Still, further study and evaluation of many of the safety concerns are required.

21027 (CONF-8104190—1) Electric vehicles: a strategy for reduced utilization of critical fuels in transportation. Gay, E.C.; Miller, W.; Kaun, T. (Argonne National Lab., IL (USA)). Feb 1981. Contract W-31-109-ENG-38. 20p. NTIS, PC A02/MF A01. Order Number DE83007600.

From 8. annual meeting of National Organization of Black Chemists and Chemical Engineers; Chicago, IL, USA (22 Apr 1981).

The performance of lead-acid, nickel-zinc, nickel-iron, lithium/iron sulfide and sodium sulfur batteries for use in electric vehicles is briefly compared and the development of one advanced battery system, the lithium/iron sulfide battery is discussed in details. Progress in the development of Li-Al/FeS cells and hardware for high performance batteries by Argonne National Laboratory and industrial subcontractors has given promise to the expectation of developing rechargeable batteries with up to three times the energy density of the lead-acid battery and the subsequent replacement of conventional gasoline cars used for urban transportation by electric-vehicles powered by these high performance batteries. Results were shown which indicate that the Li-Al/FeS system has no inherent performance limitations which would restrict its use for this application. Recent improvements in the cell cycle life and reduction in the capacity loss rate gives promise of high cell reliability over very long cycling periods. (LCL)

21028 (PB—82-260019) Assessment of battery buses and battery technology. Final report Aug 81-May 82. (Trans Systems Corp., Vienna, VA (USA)). May 1982. 93p. NTIS, PC A05/MF A01.

Public concern, with the deterioration of the quality of the environment caused by air, water, and noise pollution, became a major public issue during the 1960s, resulting in the passage of new legislation and institutional changes in the United States. This concern was not limited to the United States, but also made itself felt with similar intensity in most of the other industrialized nations. One consequence was a renewed interest in the use of electric power for propulsion with reduced pollutant emissions and noise levels as a substitute for the internal combustion engine. Because of its effect on the urban environment and its visibility, the transit bus became a prime target for conversion to electric propulsion, particularly through the use of the electric storage battery. In general, electric power is now an attractive alternative to the use of petroleum-based fuels in urban transportation.

21029 (PB—83-126086) Synthetic fuels for transportation. Background Paper Number 1: the future potential of electric and hybrid vehicles. Carriere, W.M.; Hamilton, W.F.; Morecraft, L.M. (Office of Technology Assessment (U.S. Congress), Washington, DC). Mar 1982. 236p. NTIS, PC A11/MF A01.

This report presents a comprehensive review of the future of electric and hybrid vehicles through the year 2010 in the United States. It discusses the technology, performance, and limitations of probable future electric and hybrid vehicles; the infrastructure necessary to produce and support them; marketability; and finally, effects on the nation if used in large numbers.

21030 (UCRL—88221) Comments on "Technology for the renewal of transportation infrastructure". O'Connell, L.G. (Lawrence Livermore National Lab., CA (USA)). Sep 1982. Contract W-7405-ENG-48. 8p. (CONF-820999—1). NTIS, PC A02/MF A01. Order Number DE83006582.

From California business: realities/prospects conference; Berkeley, CA, USA (13 Sep 1982).

Comments on paper by William L. Garrison.

The technical improvements that have been made in both battery-powered and roadway-powered electric vehicles, and the contribution that expanded use of such vehicles in the USA could make toward continued population mobility, decrease dependence on petroleum, and decreased urban traffic congestion and pollution are discussed. (LCL)

21031 (CAPE—2706) Near term electric test vehicle ETV-2 (Engineering Materials). (AiResearch Mfg. Co., Los Angeles, CA (USA)). [nd]. Contract AC03-76CS51213. TIC. Order Number DE83006423.

Engineering drawings are provided for ETV-2, a unique battery-powered passenger vehicle has been developed that provides a significant improvement over conventional electric vehicle performance, particularly during stop-and-go driving. The vehicle is unique in two major respects: (1) the power system incorporates a flywheel that stores energy during regenerative braking and makes possible the acceleration capability needed to keep up with traffic without reducing range to unacceptable values; and (2) lightweight plastic materials are used for the vehicle unibody to minimize weight and increase range. Reference DOE/CS/51213-01. (WHK)

3304 Hybrid Systems

REFER ALSO TO CITATION(S) 21029

3305 Flywheel Propulsion

21032 (UCRL—88107) Can fiber-composite flywheels increase automobile fuel economy. O'Connell, L.G. (Lawrence Livermore National Lab., CA (USA)). Dec 1982. Contract W-7405-ENG-48. 16p. (CONF-830408—2). NTIS, PC A02/MF A01. Order Number DE83005336.

From 28. national Society for the Advancement of Materials Process Engineers symposium; Anaheim, CA, USA (12 Apr 1983).

Overall petroleum consumption in the US has decreased, but no in the transportation sector. In 1981, transportation's use of petroleum increased. If we are to stop this trend without curtailing the vehicle miles traveled (VMT), automobiles must get smaller or the fuel economy of the current sizes must increase. Flywheels have long been considered as a means of improving fuel economy. Flywheels utilized with the internal combustion engine (ICE) allow the engine to be load-leveled. Thus the engine can operate in the region of minimum brake specific fuel consumption or maximum fuel economy. In addition, the flywheel can be used to recover the vehicle's kinetic energy during deceleration and braking operations for later use during acceleration. This adds further to the vehicle's fuel economy. There are two general approaches to the use of the flywheel. In one case, the flywheel power boosts the ICE-supplies power transients, and in the other case, the flywheel drives the wheels and is recharged by the ICE periodically at a constant rate. Each of these approaches has different implications for the flywheel and fiber composite flywheels, in particular. These implications are discussed. This paper results from a recent review of analytical studies of flywheel/heat engine propulsion systems for automobiles that have been conducted over the last 10 or so years and the current expectations of the Fiber Composite Flywheel Development Project within the Transportation Systems Research Program at LLNL. This has provided a more global understanding of the propsects for fiber composite flywheels to increase fuel economy. It has also surfaced issues that need to be addressed both experimentally and analytically if fiber composite flywheels are to find a niche in the automotive market. These findings are presented.

3306 Vehicle Design Factors

REFER ALSO TO CITATION(S) 20951, 20952

3307 Emission Control

REFER ALSO TO CITATION(S) 21015

21033 (PB—83-116830) Characterization of exhaust emissions from methanol- and gasoline-fueled automobiles. Final report Jun 81-Mar 82. Smith, L.R.; Urban, C.M. (Southwest Research Inst., San Antonio, TX (USA)). Aug 1982. 180p. NTIS, PC A09/MF A01.

This report describes the laboratory effort to characterize regulated and unregulated exhaust emissions from four light-duty, spark-ignited automobiles. Two of the automobiles, a 1981 Ford Escort and a 1981 Volkswagen Rabbit, were evaluated with gasoline; one of these was also operated on a gasoline-alcohol blend. The two other vehicles, also a 1981 Escort and a 1981 Rabbit, were evaluated with methanol fuel. The automobiles were evaluated over the Light-Duty Federal Test Procedure (FTP) and the Highway Fuel Economy Driving Schedule (HFET). Additional evaluations with the methanol-fueled Escort and Rabbit were conducted using promoted base metal catalysts, and the Escort was evaluated in a non-catalyst configuration. Exhaust constituents measured, in addition to the regulated emissions, include: aldehydes (including formaldehyde), particulates, individual hydrocarbons, methanol, ethanol, ammonia, cyanide, amines, nitrosamines, and methyl nitrite. Additional exhaust evaluations included mass spectral and Ames bioassay analyses.

3308 Alternative Fuels

REFER ALSO TO CITATION(S) 19414, 19945, 19946, 19952, 21012, 21762, 21763

21034 **(DOE/R5/10332—1) Alternate vehicle fuel for small fleet. Final technical report, September 28, 1981-December 24, 1982.** (Rice Lake, City of, WI (USA)). Dec 1982. Contract FG02-81R510332. 17p. NTIS, PC A02/MF A01. Order Number DE83007132.

The goal for the City of Rice Lake using the Department of Energy's Grand Award was to establish a methane fuel station and a ten-vehicle fleet as a demonstration project. The project would serve municipal and commercial vehicles to demonstrate an alternate utilization of our energy source (natural gas) and the benefits derived from it. Operational data was properly documented so commercial firms, institutions, and individuals can utilize the data for evaluating cost benefit ratio. Through the use of methane gas, the fuel cost to the City is projected to be reduced by 50% while utilizing a safer, cleaner, and nationally produced fuel.

36 MATERIALS

REFER ALSO TO CITATION(S) 19749, 20325

21035 **(CONF-820547—16) Diffusion mechanisms in grain boundaries in solids.** Peterson, N.L. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 40p. NTIS, PC A03/MF A01. Order Number DE83007731.

From 84. annual meeting of the American Ceramic Society; Cincinnati, OH, USA (2 May 1982).

A critical review is given of our current knowledge of grain-boundary diffusion in solids. A pipe mechanism of diffusion based on the well-established dislocation model seems most appropriate for small-angle boundaries. Open channels, which have atomic configurations somewhat like dislocation cores, probably play a major role in large-angle grain-boundary diffusion. Dissociated dislocations and stacking faults are not efficient paths for grain-boundary diffusion. The diffusion and computer modeling experiments are consistent with a vacancy mechanism of diffusion by a rather well-localized vacancy. The effective width of a boundary for grain-boundary diffusion is about two atomic planes. These general features of grain-boundary diffusion, deduced primarily from experiments on metals, are thought to be equally applicable for pure ceramic solids. The ionic character of many ceramic oxides may cause some differences in grain-boundary structure from that observed in metals, resulting in changes in grain-boundary diffusion behavior. 72 references, 5 figures.

21036 **(NASA-CR—165076) NBS: materials measurements.** Manning, J.R. (National Bureau of Standards, Washington, DC (USA)). Jun 1981. 149p. NTIS, PC A07/MF A01.

Measurement of materials properties and thermophysical properties is described. The topics discussed are: surface tensions and their variations with temperature, impurities' convection during unidirectional solidification, measurement of high temperature thermophysical properties of liquid and solid tungsten, thermodynamic properties of refractory materials at high temperatures, and experimental and theoretical studies in wetting and multilayer adsorption.

21037 **(NIM—2115) Estimation of material variation in powdered materials. Report No. 2115.** Ellis, P.J.; Venter, J.H.; Steele, T.W. (National Inst. for Metallurgy, Randburg (South Africa). Analytical Chemistry Div.). 26 Aug 1981. 21p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE82902528.

Measures of material variation (state of homogeneity) for reference materials of powdered rocks, minerals, and ores are examined critically. It is shown that the customary analysis of variance concluding with the F-test is not a satisfactory method for the analysis of the analytical data obtained in a homogeneity experiment. It is argued that an estimation approach is more appropriate. Examples are given of values calculated from reference-material data, together with an explanation of how the results can be interpreted.

3601 Metals And Alloys

REFER ALSO TO CITATION(S) 19516, 19534, 19742, 19743, 19835, 19870, 19870, 19929, 19930, 19977, 20175, 20257, 20326, 20343, 20345, 20345, 20346, 20346, 20356, 20357, 20358, 20359, 20360, 20361, 20362, 20363, 20364, 20365, 20366, 20367, 20368, 20369, 20383, 20419, 20422, 20616, 20733, 20734, 21133, 21159, 21195, 22163, 22552, 22554, 22564, 22564, 22707, 22707, 22708, 22709, 22710, 22710, 22711, 22711, 22712, 22712, 22713, 22714, 22715, 22716, 22717, 22718, 22719, 22720, 22721, 22722, 22744

21038 **(AD-A—118288/0) Variation of the pinning force with microstructure and with the Ginzburg-Landau parameter in type II superconductors. Technical memo.** Javier, P.J. (Pennsylvania State Univ., University Park (USA). Applied Research Lab.). 1 Sep 1981. 177p. NTIS, PC A09/MF A01.

The variation of the pinning force with microstructure and with the Ginzburg-Landau parameter is studied for 53 vanadium and vanadium alloy specimens. Vanadium-carbide precipitates are used as pinning centers. The Ginzburg-Landau parameter is varied by alloying the vanadium with small quantities of gallium or niobium. Alloy compositions of V-0.20a/o Ga, V-1.05a/o Ga, V-2.96a/0 Ga, and V-4.01a/o Nb are used.

21039 **(ANL/NESC—421) MICHRD; microhardness measurement analysis.** Baumgardt, N.R. (General Electric Co., Cincinnati, OH (USA). Aircraft Engine Group). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048421.

Maxima of - 100 temperatures for each specimen 1000 indents, summed over all temperatures, for each specimen 4 readings per indent.

The Vickers pyramid number and the microhardness increment fraction are computed from filar micrometer eyepiece readings. These readings are made on indents, which have been made by an indenter, in the material being tested.GE625,635; FORTRAN IV; GECOS; 27K memory.

21040 **(BNL—32407) Structural maps and parameters important to alloy phase stability.** Watson, R.E.; Bennett, L.H. (Brookhaven National Lab., Upton, NY (USA); National Bureau of Standards, Washington, DC (USA)). 1982. Contract AC02-76CH00016. 7p. (CONF-821107—48). NTIS, PC A02/MF A01. Order Number DE83005673.

From 6. international symposium on the scientific basis for radioactive waste management; Boston, MA, USA (1 Nov 1982).

Alloy properties are often summarized on two-dimensional maps. For instance, Darken and Gurry related the terminal solubilities of alloy systems to two coordinates (the differences in electronegativities and in atomic radii of the alloy consitituents). Maps are considered here which correlate the structures in which the compounds form as well as providing some indication of whether a compound forms at some given composition in the first place. This class of map involves one coordinate which is the difference in an atomic parameter (here it will be taken to be the electronegativity) while the other is an average (in this case the d band hole count), This contrasts with Darken Gurry maps and Giessen's maps related to glass-forming ability (elsewhere in this volume) where both coordinates are differences. The situation for 50/50 transition metal alloys is reviewed and results are presented for systems off 50/50 composition. 4 figures.

21041 **(CONF-800205—18) Voids in neutron-irradiated metals and alloys.** Hendricks, R.W. (Technology for Energy Corp., Knoxville, TN (USA)). 1980. Contract W-7405-ENG-26. 15p. NTIS, PC A02/MF A01. Order Number DE83007510.

From American Institute of Metallurgical Engineers meeting; Las Vegas, NV, USA (24 Feb 1980).

Small-angle x-ray and neutron scattering are powerful analytical tools for investigating long-range fluctuations in electron (x-rays) or magnetic moment (neutrons) densities in materials. In recent years they have yielded valuable information about voids, void size distributions, and swelling in aluminum, aluminum alloys, copper, molybdenum, nickel, nickel-aluminum, niobium and niobium alloys, stainless steels, graphite and silicon carbide. In the case of aluminum, information concerning the shape of the voids and the ratio of specific surface energies was obtained. The technique of small-angle scattering and its application to the study of voids is reviewed in the paper. Emphasis is placed on the conditions which limit the applicability of the technique, on the interpretation of the data, and on a comparison of the results obtained with companion techniques such as transmission electron microscopy and bulk density. 8 figures, 41 references.

21042 **(CONF-810831—99) Depth distribution of 2-keV helium-ion irradiation-induced cavities in nickel.** Fenske, G.; Das, S.K.; Kaminsky, M. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 6p. NTIS, PC A02/MF A01. Order Number DE83007654.

From Fusion reactor materials meeting; Seattle, WA, USA (9 Aug 1981).

Transmission electron microscopy has been used to study the effect of total dose on the depth distribution of cavities (voids or bubbles) in nickel irradiated at 500°C with 20-keV $^4He^+$ ions. A transverse sectioning technique allowed us to obtain the entire depth distribution of cavities from a single specimen. The diameter, number density and volume fraction of cavities were measured as a function of depth from micrographs taken from samples sectioned parallel to the direction of the incident beam. Results for the doses at 2.9×10^{15} and 2.9×10^{16} ions/cm^2 show an increase in the average cavity diameter, number density and volume fraction with increasing dose. A further increase in dose from 2.9×10^{16} to 2.9×10^{17} ions/cm^2 also shows an increase in the average cavity diameter but a decrease in the number density. This observation is interpreted as evidence for the coalescence of cavities. 3 figures, 1 table.

21043 **(CONF-810831—102) Modifications of subsurface alloy composition during high-temperature sputtering.** Lam, N.Q.; Wiedersich, H. (Argonne National Lab., IL (USA)). Jul 1981. Contract W-31-109-ENG-38. 6p. NTIS, PC A02/MF A01. Order Number DE83007834.

From Fusion reactor materials meeting; Seattle, WA, USA (9 Aug 1981).

Changes in the subsurface composition of concentrated binary alloys during high-temperature sputtering were studied using a kinetic model that includes Gibbsian adsorption, preferential sputtering, displacement mixing, radiation-enhanced diffusion, and radiation-induced segregation. Numerical solutions were obtained for Cu-Ni alloys under 5-keV Ar^+ ion bombardment as functions of sputtering time and temperature. The effects of these various phenomena were examined in detail. The present calculations may be of importance in the areas of plasma contamination in fusion reactors, sputter depth-profiling, and elevated-temperature ion implantation.

21044 **(CONF-810831—104) Irradiation creep in simple binary alloys.** Nagakawa, J.; Sethi, V.K.; Turner, A.P.L. (Argonne National Lab., IL (USA)). Jul 1981. Contract W-31-109-ENG-38. 7p. NTIS, PC A02/MF A01. Order Number DE83007803.

From Fusion reactor materials meeting; Seattle, WA, USA (9 Aug 1981).

Creep enhancement during 21-MeV deuteron irradiation was examined at 350°C for two simple binary alloys with representative microstructures, i.e., solid-solution (Ni - 4 at. % Si) and precipitation-hardened (Ni - 12.8 at. % Al) alloys. Coherent precipitates were found to be very effective in suppressing irradiation-enhanced creep. Si solute atoms depressed irradiation creep moderately and caused irradiation hardening via radiation-induced segregation. The stress-dependence of irradiation creep in Ni - 4 at. % Si should a transition, which seems to reflect a change of mechanism from dislocation climb due to stress-induced preferential absorption (SIPA) to climb-controlled dislocation glide enhanced by irradiation.

21045 **(CONF-811145—14) Ion-irradiation studies of cascade damage in metals.** Averback, R.S. (Argonne National Lab., IL (USA)). Mar 1982. Contract W-31-109-ENG-38. 38p. NTIS, PC A03/MF A01. Order Number DE83007645.

From International conference on neutron irradiation effects; Argonne, IL, USA (9 Nov 1981).

Ion-irradiation studies of the fundamental aspects of cascade damage in metals are reviewed. The emphasis of these studies has been the determination of the primary state of damage (i.e. the arrangement of atoms in the cascade region prior to thermal migration of defects). Progress has been made towards understanding the damage function (i.e. the number of Frenkel pairs produced as a function of primary recoil atom energy), the spatial configuration of vacancies and interstitials in the cascade and the cascade-induced mixing of atoms. It is concluded for these studies that the agitation of the lattice in the vicinity of energetic displacement cascades stimulates the defect motion and that such thermal spike motion induces recombination and clustering of Frenkel defects. 9 figures.

21046 **(CONF-811145—15) Ordered alloys reveal fundamental mechanisms of neutron-damage production.** Kirk, M.A.; Blewitt, T.H. (Argonne National Lab., IL (USA)). Apr 1982. Contract W-31-109-ENG-38. 41p. NTIS, PC A03/MF A01. Order Number DE83007776.

From International conference on neutron irradiation effects; Argonne, IL, USA (9 Nov 1981).

Magnetic saturation measurements performed on Ni_3Mn during neutron irradiations are briefly reviewed and critically re-examined. Disordering during thermal-neutron bombardment at 5°K uniquely revealed the existence,number and average length of replacement collision sequences. Confirmation of our analysis by others is presented; some refinements are introduced; comparisons with recent molecular-dynamic calculations are drawn; and the (n,γ) recoil spectrum in Ni_3Mn is reanalyzed. It is concluded that 112 to 150 $<110>$ replacements occur, within one or two sequences, per (n,γ) recoil with an average energy of 492 eV. Similar measurements on Ni_3Mn during fast-neutron bombardment at 5°K yielded the total number of replacements per typical 30 keV cascade and demonstrated that very few interstitials were produced at large distances from the cascade by $<110>$ replacement sequences. Recent results on high-resolution TEM measurements of disordered zones in fast-neutron irradiated Cu_3Au are discussed and compared with damage calculations for the accurately measured fast-neutron flux and energy spectrum in CP5 and reveal the spatial characteristics of the deposited energy in individual cascades. Resistivity measurements of Cu_3Au during fast-neutron bombardment at 150°C have revealed both the disordering process within cascades and ordering by irradiation-enhanced vacancy diffusion. These experiments provide a means of comparing different neutron energy spectra and studying irradiation-enhanced diffusion in a system amenable to theoretical treatments.

21047 **(CONF-811145—17) Quantitative comparison of the void distribution in a β'-phase Ni-Al-In alloy using x-ray small-angle scattering and transmission-electron microscopy.** Epperson, J.E.; Loomis, B.A.; Lin, J.S. (Argonne National Lab., IL (USA)). Nov 1981. Contract W-31-109-ENG-38. 29p. NTIS, PC A03/MF A01. Order Number DE83007856.

From International conference on neutron irradiation effects; Argonne, IL, USA (9 Nov 1981).

Small-angle scattering is a rather mature discipline which can yield valuable information on the size, amount, and distribution of inhomogeneities encountered in materials-science research. Methods have been publisheed which permit one to extend the standard analysis of data from a small-angle-scattering experiment to include determination of the distribution of particle sizes. This extended analysis has been carried out for voids in a β'-phase Ni-Al-In alloy, and, in order to assess the reliability of the procedure, the identical void distribution as been characterized by transmission-electron microscopy. A quantitative comparison is made of the results from thses two independent experiments, and the general performance of the Brill-Schmidt method for particle-size determinations is discussed. 6 figures, 1 table.

21048 (CONF-811150—12) **Mechanism and kinetics of radiation-induced segregation in Ni-Si alloys.** Okamoto, P.R.; Rehn, L.E.; Averback, R.S.; Robrock, K.H.; Wiedersich, H. (Argonne National Lab., IL (USA); Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Festkoerperforschung). Nov 1981. Contract W-31-109-ENG-38. 7p. NTIS, PC A02/MF A01. Order Number DE83007854.

From Yamada conference on point defects and defect interactions in metals; Kyoto, Japan (16 Nov 1981).

Rutherford-backscattering and Auger chemical-depth-profiling measurements show that films of the γ'-Ni_3Si phase produced on the ion-bombarded surfaces of Ni-Si alloys obey simple parabolic growth kinetics. At low temperatures the film growth-rate constant exhibits Arrhenius behavior and varies with the fourth root of the dose rate. The apparent activation energy in this low-temperature region is ~ 0.3 eV. At high temperatures the growth constant is independent of the dose rate. The results are consistent with a diffusion-controlled growth model, which assumes Si atoms migrate in the form of a fast-diffusing Si-interstitial complex.

21049 (CONF-820274—1) **Defects in metals.** Siegel, R.W. (Argonne National Lab., IL (USA)). Jun 1982. Contract W-31-109-ENG-38. 40p. NTIS, PC A03/MF A01. Order Number DE83007638.

From 2. national symposium on positron annihilation; Madras, India (8 Feb 1982).

The application of positron annihilation spectroscopy (PAS) to the study of defects in metals has led to increased knowledge on lattice-defect properties during the past decade in two areas: the determination of atomic defect properties, particularly those of monovacancies, and the monitoring and characterization of vacancy-like microstructure development during post-irradiation and post-quench annealing. The study of defects in metals by PAS is reviewed within the context of the other available techniques for defect studies. The strengths and weaknesses of PAS as a method for the characterization of defect microstructures are considered. The additional possibilities for using the positron as a localized probe of the atomic and electronic structures of atomic defects are discussed, based upon theoretical calculations of the annihilation characteristics of defect-trapped positrons and experimental observations. Finally, the present status and future potential of PAS as a tool for the study of defects in metals is considered. 71 references, 9 figures.

21050 (CONF-820434—15) **Prevacancy effects in metals observed by positron annihilation.** Smedskjaer, L.C. (Argonne National Lab., IL (USA)). Mar 1982. Contract W-31-109-ENG-38. 4p. NTIS, PC A02/MF A01. Order Number DE83007819.

From 6. international conference on positron annihilation; Arlington, TX, USA (3 Apr 1982).

The prevacancy effects sometimes observed in high-purity, well-annealed metals, are discussed. It is concluded that these effects are extrinsic and are most likely due to positron trapping in defects. The nature of the defects is discussed, and it is pointed out that the presence of dislocations in the samples could cause prevacancy effects.

21051 (CONF-820434—16) **Positron-annihilation spectroscopy of defects in metals: an assessment.** Siegel, R.W. (Argonne National Lab., IL (USA)). Jun 1982. Contract W-31-109-ENG-38. 19p. NTIS, PC A02/MF A01. Order Number DE83007717.

From 6. international conference on positron annihilation; Arlington, TX, USA (3 Apr 1982).

Positron annihilation spectroscopy (PAS) has made significant contributions to our knowledge regarding lattice defects in metals in two areas: (i) the determination of atomic defect properties, particularly those of monovacancies, and (ii) the monitoring and characterization of vacancy-like microstructure development during post-irradiation of post-quench annealing. The application of PAS to the study of defects in metals is selectively reviewed and critically assessed within the context of other available techniques for such investigations. Possibilities for using the positron as a localized probe of the structure of atomic defects are discussed. Finally, the present status and future potential of PAS as a tool for the study of defects in metals are considered relative to other available techniques. 92 references, 20 figures.

21052 (CONF-820659—7) **Superconductivity in artificial Nb/Cu heterostructures.** Falco, C.M.; Schuller, I.K. (Argonne National Lab., IL (USA); Arizona Univ., Tucson (USA)). 1982. Contract W-31-109-ENG-38. 9p. NTIS, PC A02/MF A01. Order Number DE83007747.

From 4. conference on superconductivity in d- and f-band metals; Karlsruhe, F.R. Germany (28 Jun 1982).

Transport and tunneling measurements of artivicially prepared Nb/Cu heterostructures have been made. Samples studied had individual layers in the range 3.6 to 5000 A with total thickness ~ 1 μm. The dependence of T/sub c/ above 300 A layer thickness agrees well with proximity effect theory with no adjustable parameters. Below 300 A the data indicate the T/sub c/ of Nb decreases with layer thickness. The coupling strength 2Δ/kT/sub c/ exhibits a continuous decrease from the strong coupled value of ~ 3.8 (thick layers) toward the weak coupled value of ~ 3.5 (thin layers). No evidence is found for a change in the Nb LA and TA phonons energies from their bulk values down to ~ 10 A. These results, in conjunction with Brillouin scattering measurements of zone center phonons, imply large changes in the phonon dispersion relation as a function of layer thickness in these materials.

21053 (CONF-820662—5) **Deformation and fracture characteristics of spent Zircaloy fuel cladding.** Chung, H.M.; Yaggee, F.L. (Argonne National Lab., IL (USA)). Sep 1982. Contract W-31-109-ENG-38. 35p. NTIS, PC A03/MF A01. Order Number DE83007936.

From 6. international conference on zirconium in the nuclear industry; Vancouver, BC, Canada (28 Jun 1982).

For a better understanding of Zircaloy fuel-rod failure by the pellet-cladding interaction (PCI) phenomenon, a mechanistic study of deformation and fracture behavior of spent power reactor fuel cladding under simulated PCI conditions was conducted. Zircaloy-2 cladding specimens, obtained from fuel assemblies of operating power reactors, were deformed to fracture at 325°C by internal gas pressurization in the absence of fission product simulants. Fracture characteristics and microstructures were examined via SEM, TEM, and HVEM. Numerous dislocation tangles and cell structures, observed in TEM specimens of cladding tubes that failed in a ductile manner, were consistent with SEM observations of a limited number of dimples characteristic of microvoid coalescence. A number of brittle-type failures were produced without the influence of fission product simulants. The brittle cracks occurred near the areas compressed by the Swagelok fittings of the internally pressurized tube and propagated from the outer to the inner surface. Since the outer surface was isolated and maintained under a flowing stream of pure helium, it is unlikely that the brittle-type failure was influenced by any fission product traces. SEM fractography of the brittle-type failure revealed a large area of transgranular pseudocleavage with limited areas of ductile fluting, which were similar in appearance to the surfaces produced by in-reactor PCI-type failures. A TEM evaluation of the cladding in the vicinity of the through-wall crack revealed numerous locations that contained an extensive amount of second-phase precipitate (Zr_3O). We believe that the brittle-type failures of the irradiated spent fuel cladding in the stress rupture experiments are associated with segregation of oxygen, which leads to the formation of the order structure, an immobilization of dislocations, and minimal plastic deformation in the material.

21054 (CONF-820929—10) **Magnetic hyperfine fields in Dy/sub 1-x/Y/sub x/Al_2.** Hessel, A.; Kalvius, G.M.; Shenoy, G.K.; Zinn, W.; Wiedemann, W. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 8p. NTIS, PC A02/MF A01. Order Number DE83007765.

From IUPAP international conference on magnetism; Kyoto, Japan (6 Sep 1982).

^{161}Dy Moessbauer spectroscopy was carried out at 4.2 K on Dy/sub 1-x/Y/sub x/Al_2 for $0 \leqq x \leqq 0.6$. For $x=0$ we find $B=580$ T and f/sub Q/=2810 MHz, close to free-ion values. For x

> 0 both B and f/sub Q/ decrease weakly. We obtain (ΔB)/sub n/ = -14 T, (Δf/sub Q/)/sub n/ = -110 MHz and (ΔB)/sub nn/ = +1.6 T, (Δf/sub Q/)/sub nn/ = +4 MHz per replaced nearest and next-nearest Dy^{3+} neighbor, respectively.

21055 (CONF-821049—13) Void formation and solute segregation in ion-irradiated niobium-base alloys. Loomis, B.A.; Gerber, S.B. (Argonne National Lab., IL (USA)). Oct 1982. Contract W-31-109-ENG-38. 28p. NTIS, PC A03/MF A01. Order Number DE83007682.

From TMS/AIME fall meeting; St. Louis, MO, USA (24 Oct 1982).

The void-volume fraction in unalloyed Nb and Nb-base binary alloys containing either ~ 2.4 a/o Mo, Ti, Zr, Hf, Ni, Fe, V, or Ta has been determined following 3.0-MeV $^{58}Ni^+$ ion irradiation at 1225 K to ~ 50 dpa. also, the thermal- and irradiation-induced segregation of these substitutional-atom solutes and the intrinsic, interstitial-O impurity (~ 0.06 a/o) to the specimen surface and within the irradiation-damaged layer have been determined. The void-volume fraction and the segregation of solutes have been shown to be correlated by the solute diffusivity and the relative chemical affinity of the substitutional solutes for O. The correlated diffusion of vacancy defects and O atoms is postulated to explain the experimental results.

21056 (CONF-821049—14) Effect of helium preinjection and prior thermomechanical treatment on the microstructure of Type 316 SS. Kohyama, A.; Ayrault, G.; Turner, A.P.L.; Igata, N. (Argonne National Lab., IL (USA)). Oct 1982. Contract W-31-109-ENG-38. 20p. NTIS, PC A02/MF A01. Order Number DE83007743.

From TMS/AIME fall meeting; St. Louis, MO, USA (24 Oct 1982).

Samples of 316 SS were preinjected with 15 appM helium either hot (650°C) or cold (room temperature) and irradiated with 3 MeV Ni^+ ions to a dose level of 25 dpa at 625°C in order to test the validity of helium preinjection as a means of simulation of transmutant helium production. Results for preinjected and single-ion irradiated samples were compared to samples irradiated with 3 MeV Ni^+ and simultaneously injected with helium at a rate of 15 appM He/dpa (dual-ion irradiated samples). Preinjected samples exhibited bimodal cavity size distributions. Preinjected samples of solution annealed or solution annealed and aged material showed lower swelling than dual-ion irradiated samples. However, He preinjection in 20% cold worked samples showed greater swelling than dual-ion irradiated samples 9 figures, 1 table.

21057 (CONF-821049—15) Influence of helium-injection schedule and prior thermomechanical treatment on the microstructure of Type 316 SS. Kohyama, A.; Ayrault, G.; Turner, A.P.L. (Argonne National Lab., IL (USA)). Oct 1982. Contract W-31-109-ENG-38. 31p. NTIS, PC A03/MF A01. Order Number DE83007822.

From TMS/AIME fall meeting; St. Louis, MO, USA (24 Oct 1982).

The influence of different helium-injection schedules on microstructure development Ni^+ ion irradiated 316 SS at 625°C is discussed. Injection schedules were chosen to (1) approximate the magnetic fusion reactor condition and (2) mimic the mixed-spectrum reactor condition. Dual-ion irradiation to 25 dpa produced strongly bimodal cavity size distributions in solution-annealed and solution-annealed and aged samples, whereas single-ion irradiation followed by dual-ion irradiation to the same dose produced a cavity size distribution with a substantial component of intermediate-size cavities. Dual-ion irradiation produced only very small cavities in 20% CW material, while single-ion followed by dual-ion irradiation produced some intermediate size cavities and greater swelling. 10 figures.

21058 (CONF-821049—16) Compositional changes in Fe-Cr-Ni alloys under proton bombardment at elevated temperatures. Lam, N.Q. (Argonne National Lab., IL (USA)). Oct 1982. Contract W-31-109-ENG-38. 26p. NTIS, PC A03/MF A01. Order Number DE83007763.

From TMS/AIME fall meeting; St. Louis, MO, USA (24 Oct 1982).

Compositional redistribution in austenitic Fe-Cr-Ni alloys during energetic proton bombardment has been calculated as a function of time, temperature, and ion energy, using a kinetic model of radiation-induced segregation recently developed for ternary alloys. The effect of spatial nonuniformity in damage rates was taken into account and found to have a peculiar effect on the redistribution of the alloying elements. Enrichment of Ni occurs at the bombarded surface and in the bulk beyond the damage range, whereas Fe and Cr are enriched in the peak-damage region at the expense of their depletion in regions near the surface and beyond the damage range. These compositional changes can lead to local phase transformation, since the composition of local regions of the alloy is shifted away from the initial composition into different parts of the multicomponent phase diagram. The stability of the austenite phase in the sub-surface and post-range regions is enhanced by irradiation, while the austenite-to-ferrite transformation takes place in the peak-damage region.

21059 (CONF-821057—2) Magnetic ordering and electronic structure of $CeAl_2$. Jarlborg, T.; Freeman, A.J.; Koelling, D.D. (Geneva Univ. (Switzerland); Northwestern Univ., Evanston, IL (USA). Dept. of Physics; Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 5p. NTIS, PC A02/MF A01. Order Number DE83007827.

From International conference on the impact of polarized neutrons on solid state chemistry and physics; Grenoble, France (15 Oct 1982).

$CeAl_2$ has attracted considerable attention because of its unusual properties including a proposed competition between Kondo and anti=ferromagnetic spin-density wave ordering observed at low temperatures. Here we present results of a self-consistent spin-polarized linear muffin tin orbital band study of $CeAl_2$. In its paramagnetic state the Ce-f band is about 1 eV wide and, although principally above E/sub F/, it accommodates the additional 4f electron when compared to $LaAl_2$ and gives rise to a very high DOS at E/sub F/. The ferromagnetic state is found not to be stable. By contrast, the anti-ferromagnetic state is found to be stable with a magnetic moment of 0.88μ/sub B/ per Ce atom in very good agreement with neutron measurements by Barbara et al. Surprisingly, the anti-ferromagnetic spin-density ordering appears to be related to nesting features in the underlying Fermi surface in $LaAl_2$ (i.e., no 4f electron) rather than that of $CeAl_2$.

21060 (CONF-821174—1) Novel method for the electroless metallization of polyimide: surface oxidation of Zintl anions. Haushalter, R.C.; Krause, L.J. (Argonne National Lab., IL (USA)). Jan 1983. Contract W-31-109-ENG-38. 24p. NTIS, PC A02/MF A01. Order Number DE83007674.

From 1. technical conference polyimides; Ellensville, NY, USA (1 Nov 1982).

The techniques described here are general and should allow the preparation of a large number of novel surface-modified materials. Several methods for the chemical metallization of certain reducible organic polymers, particularly polyimide, are described. These methods depend on the very strong reducing power of the Zintl anions. Main group films can be prepared easily by treating the polymer with a solution of a Zintl anion. The main group deposition was shown to proceed by a substrate reduction/intercalation-deposition mechanism. Transition metal films can be prepared by the reaction of the appropriate metal cation with unmetallized, reduced, intercalated polyimide, K/sub x/ PIm. Finally, unique bimetallic surfaces can be prepared by a combination of these methods using the polymer first as an oxidant, then a reductant. The general reactions types described here also occur with many other substrates besides organic polymers. 11 figures.

21061 (CONF-830418—1) Radiation-induced microstructural changes in Ni-C and Pt-C alloys. Regnier, P.G.; Lam, N.Q. (Argonne National Lab., IL (USA)). Nov 1982. Contract W-31-109-ENG-38. 5p. NTIS, PC A02/MF A01. Order Number DE83007815.

From International conference on dimensional stability and mechanical behavior of irradiated metals and alloys; Brighton, UK (11 Apr 1983).

Microstructural changes in Ni-C and Pt-C alloys under irradiation inside a high-voltage electron microscope were investigated as a function of energy and temperature. Two main aspects of microstructural damage by electron irradiation at energies below the displacement threshold of the host elements are discussed: direct displacement of light C solutes by the incident electrons and indirect displacement of heavy Ni and Pt atoms by secondary C-solvent atom collisions. The present study provides new insights into the mechanisms that lead to the formation of defect aggregates in interstitial alloys during sub-threshold energy irradiation. 5 figures.

21062 (CONF-8006233—) Requirements for heat resistant and highly heat resistant materials in the construction of stationary turbines. Deblon, B. (Kraftwerk Union A.G., Muelheim an der Ruhr (Germany, F.R.)). 1980. 28p. (In German). NTIS, PC A03/MF A01.

From Seminar on heat treatment of heat resistant and highly heat resistant materials; Schloss Dachau, F.R. Germany (12 Jun 1980).

Presented at Status-Sem. on Waermebehandlung warmfester u. hochwarmfester Werkstoffe, Schloss Dachau, West Germany, 12-13 Jun. 1980.

The requirements for the characteristics of construction materials for turbines are discussed as regards design and cost estimates in order to cope with the demand for higher power and efficiency in the field of electric energy production. This demand entails larger dimensions and higher pressure and temperature at the turbine entrance. The material requirements for blades, rotor parts, housing, and components in contact with hot vapor and hot gas are deduced. It is impossible to fulfill all requirements at the same time. Optimization stresses the important material characteristics, bearing in mind that results on small workpieces are not necessarily transferable to larger ones. (ESA)

21063 (CONF-8108102—2) Implications for surface science of Doppler-shift laser-fluorescence spectroscopy. Gruen, D.M.; Krauss, A.R.; Pellin, M.J.; Wright, R.B. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 37p. NTIS, PC A03/MF A01. Order Number DE83007869.

From 5. international summer institute for surface sciences; Milwaukee, WI, USA (23 Aug 1981).

This paper deals with the recent development of laser-induced fluorescence of sputtered atoms. Doppler-shift laser-induced fluorescence spectroscopy (LFS) provides a sensitive, high-resolution method for obtaining both sputtered neutral atom and ion velocity distributions and relative sputtering yields. Certain aspects of charge transfer processes at surfaces are reviewed particularly as they relate to theories of secondary ion emission. It is shown how LFS has been used to determine the number density velocity distributions of neutral Zr atoms sputtered from a Zr metal surface in the a^3F_2 ground state and in two metastable states ($a^3F_{3\ 4}$) which lie 570 and 1241 cm^{-1} above the ground state. Sputtering was by Ar^+ and Kr^+ ions at 1.5 to 3 keV. 50 references, 11 figures, 2 tables. (DLC)

21064 (CONF-8208118—1) Diffusion mechanisms in grain boundaries in metals. Peterson, N.L. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 18p. NTIS, PC A02/MF A01. Order Number DE83007785.

From Diffusion in metals and alloys conference; Tihany, Hungary (29 Aug 1982).

A critical review is given of our current knowledge of models and mechanisms for grain-boundary diffusion in metals. A pipe mechanism of diffusion based on the well-established dislocation model seems most appropriate for small-angle boundaries. Open channels, which have atomic configurations somewhat like dislocation cores, probably play a major role in large-angle grain-boundary diffusion. Dissociated dislocations and stacking faults are not efficient paths for grain-boundary diffusion. The diffusion and computer modeling experiments are consistent with a vacancy mechanism of diffusion by a rather well localized vacancy. The effective width of a boundary for grain-boundary diffusion is about two atomic planes. 56 references, 6 figures.

21065 (CONF-8210116—2) Solution hardening and strain hardening at elevated temperatures. Kocks, U.F. (Argonne National Lab., IL (USA)). Oct 1982. Contract W-31-109-ENG-38. 28p. NTIS, PC A03/MF A01. Order Number DE83007745.

From American Society of Metals meeting; St. Louis, MO, USA (24 Oct 1982).

Solutes can significantly increase the rate of strain hardening; as a consequence, the saturation stress, at which strain hardening tends to cease for a given temperature and strain rate, is increased more than the yield stress: this is the major effect of solutes on strength at elevated temperatures, especially in the regime where dynamic strain-aging occurs. It is shown that local solute mobility can affect both the rate of dynamic recovery and the dislocation/dislocation interaction strength. The latter effect leads to multiplicative solution strengthening. It is explained by a new model based on repeated dislocation unlocking, in a high-temperature limit, which also rationalizes the stress dependence of static and dynamic strain-aging, and may help explain the plateau of the yield stress at elevated temperatures. 15 figures.

21066 (DOE/ER/10429—4) Atomistic studies of grain boundaries with segregated impurities. Progress report, Jul 1, 1982-Jun 30, 1983. Vitek, V. (Pennsylvania Univ., Philadelphia (USA). Dept. of Materials Science and Engineering). Feb 1983. Contract AC02-79ER10429. 19p. NTIS, PC A02/MF A01. Order Number DE83007982.

An extensive multiplicity of grain-boundary structures occurs in general boundaries. Transformations between different structures occur through absorption or emission of vacancies. As the concentration of the solutes in the boundary increases two-dimensional ordered structures are formed whose crystallography is governed by the structure of the originally pure boundary and the solute-solute interaction. In the case of an alloy where ordering is unfavorable, these structures correspond to the maximum concentration which can be achieved by exchange of solvent and solute atoms. However, if ordering is favored, these ordered structures may extend further into the lattice on each side of the boundary. Significant changes occur in the boundary structure during segregation. The relative displacement of the grains changes. Transformations into other possible multiple structures are often induced and new structures may be stabilized. This implies that the extensive multiplicity of structures may be reduced which may lead to significant decrease in the ability of boundaries to absorb or emit vacancies. Similarly, diffusivity may be reduced. This would be reflected in the effects of segregation on the high-temperature behavior of materials. Transformations occurring in the boundaries lead to their migration if they correspond to transitions between different multiple structures. Thus migration induced by a flux of impurities could occur, analogously to the diffusion-induced grain-boundary migration.

21067 (DOE/ER/10433—T1) Microstructural approach to fatigue-crack processes in polycrystalline bcc materials. Annual technical progress report IV. Gerberich, W.W. (Minnesota Univ., Minneapolis (USA). Dept. of Chemical Engineering and Materials Science). 1 Mar 1983. Contract AC02-79ER10433. 21p. NTIS, PC A02/MF A01. Order Number DE83007912.

The following were studied: strain-rate sensitivity of Ti-30 Mo after cyclic stabilization, cyclic stress-strain of Ti-30 Mo, plastic strain distributions in Fe-4% Si single crystal cleavage, fatugue closure and thresholds in Fe binary alloys, and fatigue crack thresholds in HSLA steel. 8 figures. (DLC)

21068 (DOE/ER/10570—T1) Mechanisms of damage accumulation in time-dependent cyclic deformation. Progress report, January 1, 1982-December 31, 1982. Laird, C. (Pennsylvania Univ., Philadelphia (USA). Dept. of Materials Science and Engineering). Aug 1982. Contract AC02-80ER10570. 7p. NTIS, PC A02/MF A01. Order Number DE83000993.

Two kinds of damage produced in cyclic creep were studied: (1) change in the dislocation density and arrangement, to be studied in copper and (2) damage phenomena perhaps involving precipitates in Cr-Mo-V rotor steel. In copper tested at low temperatures, strain bursts were recognized for the first time in polycrystals of a pure metal in both cyclic and static creep. Cyclic stress-strain response in cyclic creep was defined, and a study of single crystals carried out in order to study better the dislocation structures associated with bursts. Because of its superior quality, a Westinghouse rotor steel was eventually chosen for detailed study. Effort was directed this year on the high temperature testing apparatus. High temperature tests have been extended to lower amplitudes.

21069 **(DOE/NBM—3008210) Description of the method of producing coatings of Raney nickel catalyst by flame-spraying and findings obtained by examining samples of the coatings.** (Department of Energy, Pittsburgh, PA (USA). Pittsburgh Energy Research Center). [nd]. 12p. NTIS, PC A02/MF A01. Order Number DE83008210.

Raney Nickel, a commercially available powdered nickel-aluminum catalyst, has been flame-sprayed onto various stainless steel shapes used in methanation reactors for the purpose of developing a process to make synthetic natural gas (methane, CH_4) from 3:1 synthesis gas ($3H_2 + 1CO$) produced in a coal gasifier. The flame spray equipment used is commercially available and the spray parameters selected are essentially conventional, but some equipment modifications and variations in spray techniques have been made to produce acceptable coated reactor surfaces. Examination of the coatings shows that a multi-phase structure of Ni_2Al_3, $NiAl_3$ and a eutectic of Ni_2Al_3 and α-aluminum is deposited.

21070 **(EPRI-CS—2858) Electrochemical measurement of corrosion rates in cathodically protected systems. Final report.** McKubre, M.C.H. (SRI International, Menlo Park, CA (USA)). Feb 1983. 60p. NTIS, PC A04/MF A01. Order Number DE83901467.

Objective was to evaluate the use of harmonic analysis as a nondestructive, in-situ method of measuring corrosion rates of cathodically protected components in the tube/tube sheet/water box region of steam surface condensers. A frequency response analyzer was used to measure the fundamental and harmonic current response to a sinusoidal voltage perturbation imposed on cylindrical specimens of CuNi alloys and titanium, in aerated synthetic ocean water. The results were analyzed using a mathematical procedure and computer program developed in this study. Calculated corrosion rates were compared with direct mass loss measurements and good agreement was obtained. However, due to very small corrosion rates under cathodic protection, direct mass loss determinations include very large uncertainties. The corrosion rates computed from the harmonic analysis vary in the expected way with convection and cathodic protection potential.

21071 (INIS-mf—7432, pp vp) **Effect of the sample preparation technique on gamma-ray asymmetry of Tb isotopes in a gadolinium matrix.** Dupak, J. (Joint Inst. for Nuclear Research, Dubna (USSR)); Pust, L. (Ceskoslovenska Akademie Ved, Prague. Fyzikalni Ustav); Machova, A.; Rikovska, J. (Ceske Vysoke Uceni Technicke, Prague (Czechoslovakia)). [nd]. (In Czech). NTIS (US Sales Only), PC A06/MF A01.

From 6. conference of Czechoslovak physicists; Ostrava, Czechoslovakia (27 Aug 1979).

21072 **(LA-UR—82-2428) Deformation of microstructures due to low-velocity particulate erosion of ductile metals by spherical particles.** Follansbee, P.S.; Banerjee, D.; Williams, J.C. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 29p. (CONF-830402—1). NTIS, PC A03/MF A01. Order Number DE82021890.

From International conference on weat of materials - mechanisms and control of wear; Washington, DC, USA (11 Apr 1983).

A simple cumulative damage model has been developed for the low-velocity, normal-incidence, erosion of ductile metals by spherical particles. The model correlates the computed plastic-strain distribution for different impact velocities and materials with the experimentally measured erosion rates. This paper describes the surface and sub-surface changes which occur in Cu and Cu-6 wt % Al specimens during erosion testing. Scanning and transmission electron microscopy have been used to study these changes in order to determine whether the deformed microstructures are consistent with the predictions of the model. Because the deformation due to the impact of a 50°m-diameter spherical particle occurs at high strain rates (10^6 s^{-1}) and is also highly localized, the deformation mechanisms differ slightly from bulk deformation which has been reported for low strain rates. The contribution of strain localization (adiabatic shear) and twinning is discussed in light of the microstructural observations. 7 figures.

21073 **(LBL—14535) Microstructures, transformations and properties of oxidation-resistant, iron-base, aluminum-modified alloys.** Tamayo, G.L. (Lawrence Berkeley Lab., CA (USA)). Dec 1982. Contract AC03-76SF00098. 64p. NTIS, PC A04/MF A01. Order Number DE83007064.

Effects of different cooling rates on the microstructure and properties of an Fe-8Al-6Mo-0.25Nb-0.8Zr-0.1Ce-0.1C alloy, initially heat treated at 900°C for one hour, were investigated. Electron diffraction and microscopy revealed in air-cooled specimens a uniform distribution of second phase particles of ~ 3000°A consisting principally of Fe, Mo, and Nb. Evidence of DO_3 ordered particles was also found at this cooling rate. Oil-quenched and water-quenched specimens presented a more distorted matrix with a smaller gain size but the presence of second phase particles was not evident. Mechanical strength and hardness were higher and ductility lower for the slowly cooled specimens. However, oxidation resistance at 1000°C in air showed only slight variation with cooling rate, and compared favorably with two austenitic stainless steels subjected to the same treatment. It is concluded that the substitution of Al for Cr and Ni in Fe-base alloys can be made with little or no loss of favorable microstructures and properties characteristic of stainless steels. 23 figures.

21074 **(LBL—14911) Microstructural influence on abrasive wear resistance of high-strength, high-toughness medium-carbon steels.** Kwok, C.K.; Thomas, G. (Lawrence Berkeley Lab., CA (USA)). Sep 1982. Contract AC03-76SF00098. 30p. (CONF-830402—2). NTIS, PC A03/MF A01. Order Number DE83002571.

From International conference on weat of materials - mechanisms and control of wear; Washington, DC, USA (11 Apr 1983).

A systematic study of abrasive wear resistance of Fe/Cr/Mn experimental steels has been carried out in two-body pin-on-disc abrasion tests. Silicon carbide, alumina, and quartz were used as abrasives. The relationships between microstructures, mechanical properties, and abrasive wear resistance for these experimental steels were studied. In addition, several commercial alloys were tested to provide a basis for comparison. Results show that dislocated lath raartensite with continuous interlath film of retained austenite appears to be a desirable microstructure for good wear resistance. Grain refinement by double heat treatment was found to improve the toughness in the experimental steels but have little effect on the abrasive wear resistance. In general, superior tensile properties and wear resistance, without sacrifice in toughness, can be achieved by a lath martensitic microstructure. 8 figures.

21075 **(LBL—15489) Damage and in-situ annealing during ion implantation.** Sadana, D.K.; Washburn, J.; Byrne, P.F.; Cheung, N.W. (California Univ., Berkeley (USA)). Nov 1982. Contract AC03-76SF00098. 15p. (CONF-821107—51). NTIS, PC A02/MF A01. Order Number DE83008394.

From 6. international symposium on the scientific basis for radioactive waste management; Boston, MA, USA (1 Nov 1982).

Formation of amorphous (α) layers in Si during ion implantation in the energy range 100 keV-11 MeV and temperature range liquid nitrogen (LN)-100°C has been investigated. Cross-sectional transmission electron microscopy (XTEM) shows that buried amorphous layers can be created for both room temperature (RT) and LN temperature implants, with a wider 100 percent amorphous region for the LN cooled case. The relative narrowing of the α layer during RT implantation is attributed to in-situ annealing. Implantation to the same fluence at temperatures above 100°C does not produce α layers. To further investigate in situ annealing effects, specimens already containing buried α layers were further irradiated with ion beams in the temperature range RT-400°C. It was found that isolated small α zones ($\leqq$ 50 diameter) embedded in the crystalline matrix near the two α/c interfaces dissolved into the crystal but the thickness of the 100 percent α layer was not appreciably affected by further implantation at 200°C. A model for in situ annealing during implantation is presented.

21076 (LBL-PUB—304-8-82) Erosion/corrosion newsletter (excerpted from LBL—13840). Levy, A.V. (Lawrence Berkeley Lab., CA (USA)). Aug 1982. Contract AC03-76SF00098. 16p. NTIS, PC A02/MF A01. Order Number DE83003647.

Research is reported on the following programs: erosion/corrosion wear, coal liquefaction alloy test, utilization of metals in oil shale retort components, and materials characterization in fossil fuel combustion products. (DLC)

21077 (MLM—3041) Nonliquid surface preparation for electrodeposition. Nesslage, G.V.; Schurman, W.R. (Monsanto Research Corp., Miamisburg, OH (USA). Mound). 10 Mar 1983. Contract AC04-76DP00053. 6p. NTIS, PC A02/MF A01. Order Number DE83008213.

A nonliquid method was developed to surface treat nonconductive material prior to electroplating. A comparison of this method with the conventional liquid method shows that the conventional method is a 21-step wet chemistry method, whereas the nonliquid method requires only seven steps to prepare a sensitized surface, and it can be performed by the deposition of material from the gaseous phase. The work accomplished to date, demonstrating the feasibility of the method, is presented.

21078 (N—82-14291) Effects of a large temperature gradient on the structure of directionally solidified eutectic composites and superalloys. Staniek, G. (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt e.V., Koeln (Germany, F.R.)). 1980. 3p. (In German). NTIS, PC A03/MF A01.

In its Colloq. on Composite Mater. 3 p (SEE N82-14289 05-24) REFS.

An apparatus for high temperature tests of the structural stability of directionally solidified eutectic composites and superalloys was developed. It was used for cooled blades in high temperature gas turbines in which fast temperature changes and important temperature gradients occur. With this apparatus, a temperature gradient of a few hundred K/mm is obtained with a maximum of 1600 K. Structural instabilities due to mechanical stresses (cracks and plastic deformation) occur especially in superalloys, although some are decidedly stable. Instabilities due to thermal loads (coarsening, transformations, decomposition of phases, oxidation) are frequently observed, but test temperatures and gradients are considerably higher than in normal operation, so the employment of these alloys is not directly limited. (ESA)

21079 (N—8230252) Review of corrosion causes and corrosion control in a technical facility. Charng, T.; Lansing, F. (Jet Propulsion Lab., Pasadena, CA (USA)). Jun 1982. 12p. NTIS, PC A10/MF A01.

Causes of corrosion of metals and their alloys are reviewed. The corrosion mechanism is explained by electrochemical reaction theory. The causes and methods of controlling of both physiochemical corrosion and biological corrosion are presented. Factors which influence the rate of corrosion are also discussed.

21080 (NASA-CASE-LEW—13450-1) Covering solid, film cooled surfaces with a duplex thermal barrier coating. Liebert, C.H. (National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center). Dec 1981. 9p. NTIS, PC A02/MF A01.

A thermal barrier coating is applied to solid film cooled hardware. Also, thermal barrier coating systems are used to provide corrosion resistance and thermal protection to these base metal surfaces. An inert gas, such as argon, is discharged through the apertures during the application of the thermal barrier coating system by plasma spraying. This flow of inert gas reduces both blocking of the holes and base metal oxidation during the coating operation.

21081 (NASA-CR—165395) Development of improved high temperature coatings for In-792 + Hf. Final report. Profant, D.D.; Naik, S.K. (Avco/Lycoming, Stratford, CT (USA)). Jun 1981. 95p. NTIS, PC A05/MF A01.

The development for t-55 1712 engine of high temperature for integral turbine nozzles with improved thermal fatigue resistance without sacrificing oxidation/corrosion protection is discussed. The program evaluated to coating systems which comprised one baseline plasma spray coating (12% Al-NiCoCrALY), three aluminide coatings including the baseline aluminide (701), two CoNiCrAly (6% Al) + aluminide systems and four NiCoCrY + aluminide coating were evaluated. The two-step coating processes were investigated since it offered the advantage of tailoring the composition as well as properly coating surfaces of an integral or segmented nozzle. Cyclic burner rig thermal fatigue and oxidation/corrosion tests were used to evaluate the candidate coating systems. The plasma sprayed 12% Al-NiCoCrAlY was rated the best coating in thermal fatigue resistance and outperformed all coatings by a factor between 1.4 to 2.5 in cycles to crack initiation. However, this coatings is not applicable to integral or segmented nozzles due to the line of sight limitation of the plasma spray process. The 6% Al-CoNiCrAlY + Mod. 701 aluminide (32 w/o Al) was rated the best coating in oxidation/corrosion resistance and was rated the second best in thermal fatigue resistance.

21082 (PB—82-203324) Corrosion behaviour of engineering materials at elevated temperatures in an oxidising environment containing sulphur derivatives: influence of the composition of aggressive media and of the alloys under test (tenue a la corrosion a temperature elevee de materiaux par les milieux oxydants contenant des derives soufres: influence de la composition des phases agressives et des alliages exprimentes). Final report. Vincent, L.M.; Cappelaere, M.; Dominget, R.; Rurcot, G. (Commission of the European Communities, Luxembourg). [nd]. 67p. NTIS, PC AE04/MF E04.

In a study aiming at a deeper understanding of the mechanism of corrosion, the behaviour of several alloys and metals was examined at three different temperatures (773K, 873K and 1073K), viz, Alloy 600, Alloy 800, Uranus S, an iron-chromium-aluminium alloy and a ferrous alloy with 40% aluminium, as well as the metals iron, chromium, nickel, molybdenum and titanium.

21083 (PNL-SA—9287) Strength changes in vanadium and titanium irradiated with 14-MeV neutrons. Bradley, E.R.; Jones, R.H. (Pacific Northwest Lab., Richland, WA (USA)). 1981. Contract AC06-76RL01830. 4p. (CONF-810831—90). NTIS, PC A02/MF A01. Order Number DE82012860.

From Fusion reactor materials meeting; Seattle, WA, USA (9 Aug 1981).

The flow properties and microstructures of vanadium and titanium have been studied following irradiation at 300°K with T(d,n) neutrons. The threshold fluence for observable hardening was about 1 x 10^{21} m^{-2} for both materials while at 8 x 10^{21} m^{-2} the yield strength in the vanadium was about 1.5 times higher than for the titanium. Neither material showed the low fluence hardening plateau that is commonly observed in bcc metals and attributed to interstitial impurity atoms. Small defect clusters were found in the vanadium irradiated to 8 x 10^{21} m^{-2} while this fluence level appeared to be the threshold for observable defect clusters in titanium.

21084 (RFP—3329) PVD by electron-beam processes. Mah, G. (Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant). 1982. Contract AC04-76DP03533. 6p. (CONF-820611—3). NTIS, PC A02/MF A01. Order Number DE83006740.

From American Electroplaters Society (SUR/FIN) conference; San Francisco, CA, USA (20 Jun 1982).

Physical vapor deposition by electron beam evaporation has been used to produce coatings and resistive elements. A new technique in electron beam evaporation is hot hollow cathode evaporation. Some of the differences between electron beam evaporation and sputtering are listed, as are the process parameters and coating properties which must be correlated. Properties of Be films are correlated with substrate temperature. Hot hollow cathode evaporation of Ag is used to illustrate the effects of substrate bias voltage on coating properties. Finally, some of the applications of electron beam evaporation and the materials used are tabulated. (DLC)

21085 (RFP—3486) Galvanic corrosion of metals and coatings when coupled to uranium in severe environments. Winkle, J.R.; Childs, E.L. (Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant). 17 Aug 1982. Contract AC04-76DP03533. 43p. NTIS, PC A03/MF A01. Order Number DE83007537.

The results of galvanic testing were varied in each environment. The position of metals in the galvanic series was not fixed, but changed with environment. In all cases where high general and galvanic corrosion rates were observed, the conditions of potential, pH, and impurity content could be correlated with regions of oxide surface film instability outlined by Pourbaix Diagrams. The majority of the severe corrosion reactions were observed in the acidic environment, although a few were noted in the caustic environment. The presence of chlorides tended to enhance galvanic corrosion rates at the neutral environment. 10 tables.

21086 (RSRE-MEMO—3360) Anomalous reflectivity losses of coated mirrors used in the infrared. Ball, G.J. (Royal Signals and Radar Establishment, Malvern (UK)). Jan 1982. 22p. Royal Signals and Radar Establishment, Malvern, England.

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Reflectivity losses of aluminum mirrors at nonnormal angles of incidence (theta) are shown to occur where theta the negative square root of (the complex refractive index squared + the extinction coefficient squared). Thin layers of Y_2O_3 and of HfO_2 show losses for wavelengths 12 micron. Carbon coating is abrasion resistant, chemically durable, and optically very efficient over a wide range of theta. Maximum reflectivity decreases by 0.7% between theta zero and 60 deg.

21087 (T—15/80) Corrosion and high temperature resistant coatings for molybdenum, made out of iron and nickel alloys and applied by explosive welding. Pruemmer, R.; Henne, R. (Fraunhofer-Gesellschaft zur Foerderung der Angewandten Forschung e.V., Freiburg im Breisgau (Germany, F.R.). Inst. fuer Werkstoffmechanik). Apr 1980. 18p. (In German). NTIS, PC A02/MF A01.

The impact parameters of the explosive welding of molybdenum with Inconel 601 were determined. The combination Mo and Inconel 601 was considered as nonweldable. It can be applied in solar radiation concentrating devices, allowing a higher operating temperature and higher energy conversion efficiency. The usual velocities of the explosive welding process (collision velocities of 2200 m/sec) lead at best to samples affected by cracks, due to the insufficient workability of molybdenum. At higher velocities cracks no longer occur, molybdenum being a strain rate sensitive material. Layer composite materials can be manufactured in flat as well as in tube form. (ESA)

21088 (UCB/RP—82/D1009) New class of steels for thick-wall pressure vessels. Final technical report, June 21, 1980-June 30, 1982. Spencer, P.N.; McGee, A.C.; Parker, E.R. (California Univ., Berkeley (USA). Dept. of Materials Science and Mineral Engineering). 1982. Contract W-7405-ENG-26. 91p. NTIS, PC A05/MF A01. Order Number DE83004101.

Objective is to develop a new class of steels that can be field fabricated into very-large-diameter, very-thick-wall, pressure vessels for coal gasification/liquefaction systems, and specifically to develop an Fe-C-V-Ni based alloy which, after a simple continuous cooling process (instead of quenching and tempering), would exhibit through-thickness strength and toughness combinations comparable to those of commercially available pressure-vessel steels and which at the same time would be less susceptible to hydrogen attack. Previous work included detailed studies of isothermally transformed Fe-C-V base alloys and preliminary investigations of continuously cooled steels. Results indicated that uniform microstructures with combinations of strength and toughness could be produced in a wide range of section thicknesses. From June 1980 through June 1981, emphasis was placed on investigating the effect on mechanical properties/microstructure relationships of different austenitization temperatures and different rates of continuous cooling of six Fe-C-V-Ni-Mn alloys. During the June 1981 to June 1982 period, an additional three Fe-C-V compositions including additions of Al, Si, or Mo were added to the list of alloys being investigated. In addition to evaluation of continuous cooling characteristics and VC dissolution and coarsening kinetics, emphasis was placed on hydrogen attack and weldability studies.

21089 (UCID—19687) Determination of static friction of beryllium to beryllium and beryllium to 1040 steel. Morrison, R.L. (Lawrence Livermore National Lab., CA (USA)). Feb 1983. Contract W-7405-ENG-48. 10p. NTIS, PC A02/MF A01. Order Number DE83007307.

The coefficients of static friction of beryllium to beryllium and beryllium to 1040 steel were determined in normal atmosphere and in dry argon atmosphere. Both the incline plane and hoizontal opposing force methods were used. The agreement between the two methods, as well as the precision within each method, appears to be good. The results obtained in a dry argon atmosphere are still suspiciously low even after very careful and repeated experiments. 3 tables.

21090 (UCRL—52000-82-12, pp 10-17) **Measuring equations of state with the electric gun.** Dec 1982. NTIS, PC A02/MF A01.

In Energy and Technology Review.

We have used the electric gun to accelerate tantalum foils to velocities high enough to produce shock pressures near 1 TPa. The results confirm that the electric gun is a promising tool for studying the EOS of materials at ultrahigh pressures.

21091 (Y/DV—265) Thermal profiles from electron-beam welds on uranium-6 niobium alloy. Mustaleski, T.M.; Stanaland, V.A.; Chapman, L.R. (Oak Ridge Y-12 Plant, TN (USA)). 19 Jan 1983. Contract W-7405-ENG-26. 13p. (CONF-8210124—1). NTIS, PC A02/MF A01. Order Number DE83007283.

From DOE/ALO interagency mechanical operations group meeting; Las Vegas, NV, USA (19 Oct 1982).

Little information exists on the properties of the fusion and heat-affected Zones (HAZ) in U-6Nb alloy. This paper reviews the early steps of a program to gather such information. Several preliminary tests were made to determine welding parameters which would give full penetration on the 0.125-in. thick plate. The time-temperature histories experienced by the weld HAZ were compared to those generated by the computer code TEMP. 6 figures. (DLC)

21092 Positional reference system for ultraprecision machining. Arnold, J.B.; Burleson, R.R.; Pardue, R.M. (to Dept. of Energy). US Patent 4,365,301. 21 Dec 1982. Filed date 12 Sep 1980. vp.

PAT-APPL-186869.

A stable positional reference system for use in improving the cutting tool-to-part contour position in numerical controlledmultiaxis metal turning machines is provided. The reference system employs a plurality of interferometers referenced to orthogonally disposed metering bars which are substantially isolated from machine strain induced position errors for monitoring the part and tool positions relative to the metering bars. A microprocessor-based control system is employed in conjunction with the plurality of position interferometers and part contour description data inputs to calculate error components for each axis of movement and output them to corresponding axis drives with appropriate scaling and error compensation. Real-time position control, operating in combination with the reference system, makes possible the positioning of the cutting points of a tool along a part locus with a substantially greater degree of accuracy than has been attained previously in the art by referencing and then monitoring only the tool motion relative to a reference position located on the machine base.

21093 Method for producing microporous metal bodies. Danko, J.C. (to Dept. of Energy). US Patent 4,362,564. 7 Dec 1982. Filed date 12 Sep 1967. vp.

PAT-APPL-668744.

Tungsten is vapor-deposited by hydrogen reduction of tungsten hexafluoride (Wf_6) to produce a tungsten body having from 40 to 100 ppm fluorine. The tungsten is then heated under vacuum produce grain boundary porosity for a sufficient period of time to allow the pores along the grain boundaries to become interconnected.

21094 Method of producing microporous joints in metal bodies. Danko, J.C. (to Dept. of Energy). US Patent 4,362,582. 7 Dec 1982. Filed date 12 Sep 1967. vp.

PAT-APPL-668743.

Tungsten is placed in contact with either molybdenum, tantalum, niobium, vanadium, rhenium, or other metal of atoms having a different diffusion coefficient than tungsten. The metals are heated so that the atoms having the higher diffusion coefficient migrate to the metal having the lower diffusion rate, leaving voids in the higher diffusion coefficient metal. Heating is continued until the voids are interconnected.

21095 Magnetic and electronic properties of Ni films, surfaces, and interfaces. Tersoff, J.; Falicov, L.M. (Materials and Molecular Research Division, Lawrence Berkeley Laboratory and Department of Physics, University of California, Berkeley, California 94720). *Physical Review* [*Section*] *B: Condensed Matter;* **26**: No. 11, 6186-6200(1 Dec 1982).

Results of various calculations lead to a unified understanding of the magnetic behavior of thin nickel films. We thus explain disparate experimental results. We report results for magnetic and electronic properties of Ni films of one to five atomic layers on Cu (100) and (111), of the Ni-Cu (100) and (111) interfaces, and of the Ni (100) and (111) surfaces. Results are in good agreement with the few published calculations. We find that magnetization is suppressed at the Ni-Cu interface, but enhanced in isolated thin films. The net effect of this competition is that a Ni monolayer is substantially magnetic on Cu(100) but paramagnetic (or nearly so) on Cu(111). Film magnetization is found to be very sensitive to substrate composition. For substrates which couple strongly to the Ni film, ferromagnetism first appears at about three atomic layer Ni, in quantitative agreement with experiments based on Al and Pb-Bi substrates. The crucial mechanism acting to suppress Ni magnetization is sp-d hybridization, just as in most Ni alloys.

21096 Absence of phason contribution in the specific heat of potassium. Van Curen, J.; Hornung, E.W.; Lasjaunias, J.C.; Phillips, N.E. (Department of Chemistry, University of California, Berkeley, California 94720). *Physical Review Letters;* **49**: No. 22, 1653-1656(29 Nov 1982). Contract AC03-76SF00098.

The specific heat of potassium has been measured between 0.33 and 20 K, on an accurate and well documented temperature scale. The results show no evidence of the previously reported phason contribution.

21097 Electronic structure of clean and carbon-covered closed-packed rhodium and ruthenium surfaces. Feibelman, P.J. (Sandia National Laboratories, Albuquerque, New Mexico 87185). *Physical Review* [*Section*] *B: Condensed Matter;* **26**: No. 10, 5347-5356(15 Nov 1982).

In order to determine the nature of the active species which several groups have found to be important in catalytic carbon hydrogenation reactions, self-consistent linear combination of atomic orbitals (LCAO) calculations have been performed of the electronic structure of clean and C-covered Rh(111) and Ru(0001) surfaces. Apart from the shift of the Fermi level to higher energy to accomodate an extra electron per atom in Rh, the results are quite similar for the two metals. A (1 x 1) layer of C's, occupying threefold-coordination sites binds by forming tetrahedral bonds with its neighbors, leaving a nonbonding p/sub z/ band at the Fermi energy. Thus the model C species examined here should be very reactive. Additionally, the C 2s—C 2pz binding-energy difference is about 10 eV, in accord with the Auger-peak separation seen by Goodman et al. for a reactive carbidic layer on Ni. Partial local density of states (LDOS) and energy-band dispersion curves are presented to permit the verification of the model carbidic overlayer. Results presented for the clean surfaces include work functions that are in excellent accord with the measured values, and band dispersions, notably a surface resonance band that has been observed on Ru, by Himpsel et al. Finally, surface-bulk core-level binding-energy shifts have been calculated. For the clean surfaces, they are in reasonable agreement with empirical heats of segregation. For the C-covered surfaces, they indicate that C binds most strongly to Ru, followed by Rh and Pd.

21098 Phonon dispersion curves of fcc La. Stassis, C.; Loong, C.; Zarestky, J. (Ames Laboratory and Department of Physics, Iowa State University, Ames, Iowa 50011). *Physical Review* [*Section*] *B: Condensed Matter;* **26**: No. 10, 5426-5432(15 Nov 1982). Contract W-7405-ENG-82.

Large single crystals of fcc La were grown in situ and were used to study the lattice dynamics of this phase of La by coherent inelastic neutron scattering. The phonon dispersion curves have been measured along the [ξ00], [ξξ0], [ξξξ], and [0ξ1] symmetry directions at 660 and 1100 K. The T[ξξξ] branch exhibits anomalous dispersion for $\xi > 0.25$ and, in addition, close to the zone boundary, the phonon frequencies of this branch decrease with decreasing temperature. This soft-mode behavior may be related to the $\beta \rightarrow \alpha$ transformation in La, an assumption supported by recent band-theoretical calculations of the generalized susceptibility of fcc La. At X the frequencies of the L[ξ00] branch are considerably lower than those of the corresponding branch of γ-Ce; a similar but not as pronounced effect is observed for the frequencies of the L[ξξξ] branch close to the point L. Since the calculated generalized susceptibility of fcc La exhibits strong peaks at X and L, these anomalies may be due to the renormalization of the phonon frequencies by virtual fbold-arrow-left-rightd transitions to the unoccupied 4f level in La. The data were used to evaluate the elastic constants, the phonon density of states, and the lattice specific heat at constant pressure C/sub P//sup(1/).

21099 Theory of static structural properties, crystal stability, and phase transformations: Application to Si and Ge. Yin, M.T.; Cohen, M.L. (Department of Physics, University of California, and Materials and Molecular Research Division, Lawrence Berkeley Laboratory, Berkeley, California 94720). *Physical Review* [*Section*] *B: Condensed Matter;* **26**: No. 10, 5668-5687(15 Nov 1982).

We demonstrate that not only the static structural properties but also the crystal stability and pressure-induced phase transformations in solids can be accurately described employing an ab initio pseudopotential method within the local-density-functional formalism. With the use of atomic numbers of constituent elements and a subset of crystal structures as the only input information, the calculated structural properties of Si and Ge are in excellent agreement with experiment.

21100 Radiative decay of surface plasmons on oblate spheroids. Little, J.W.; Ferrell, T.L.; Callcott, T.A.; Arakawa, E.T. (Health and Safety Research Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Physical Review* [*Section*] *B: Condensed Matter;* **26**: No. 10, 5953-5956(15 Nov 1982). Contract W-7405-ENG-26.

We have obtained a general expression for the radiative decay rate of surface-plasmon modes on oblate spheroids in terms of familiar spherical functions. Experimental observations of the polarization, wavelength, and angular dependence of light emitted by electron-bombarded silver spheroids were compared with the theoretical calculations, and good agreement was obtained. We have shown that it is possible to use both nonretarded electrodynamics and bulk-metal optical properties to describe plasmons on particles with 10—40 nm dimensions. The results given can be used to study the angular and wavelength characteristics of other plasmon-related effects such as photoemission and surface-enhanced Raman scattering.

21101 **Enhanced thermal conduction associated with formation of the superionic state.** Williams, R.K. (Metals and Ceramics Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Physical Review [Section] B: Condensed Matter;* **26**: No. 10, 5983-5986(15 Nov 1982). Contract W-7405-ENG-26.

High anion mobilities associated with formation of the superionic state in fluorite crystals may lead to a measurable enhancement of the thermal conductivity. The enhancement was estimated for $SrCl_2$, and found to reach a maximum value of about 0.02 W/m K. The temperature dependence of the effect differs from that of ambipolar thermodiffusion of electron-hole pairs. The enhancement due to ionic transport is dependent on the thermodynamics of the anion disordering process, and some experimental tests of the mechanism are suggested.

21102 **Deuterium re-emission from 304LN stainless steel.** Wilson, K.L.; Baskes, M.I. (Sandia National Labs., Livermore, CA (USA)). *Journal of Nuclear Materials;* **111**: 622-627(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN, USA (3 - 7 May 1982).

Deuterium re-emission measurements have been conducted on 304LN stainless steel implanted cyclicly with 10 keV D^+ or D_2^+ at temperatures from 35 to 95°C. Re-emission during implantation was more rapid at the higher temperatures, but slowed markedly for the higher-energy implantations. The data are consistent with a model involving diffusion in the presence of trapping sites with a recombination boundary condition. Detrapping from an approx. equal to 0.8 eV radiation damage trap appears to be the rate limiting step for release in the temperature range of 35 to 65°C. Molecular recombination becomes important for implantation temperatures approx. $>=$ 95°C. The model is applied to wall re-emission calculations for tokamaks such as TFTR.

21103 **Deuterium retention in helium-damaged stainless steel: detrapping energy.** Pontau, A.E.; Baskes, M.I.; Wilson, K.L.; Haggmark, L.G. (Sandia National Labs., Livermore, CA (USA)); Bohdansky, J.; Scherzer, B.M.U.; Roth, J. (Max-Planck-Institut fuer Plasmaphysik, Garching (Germany, F.R.)). *Journal of Nuclear Materials;* **111**: 6[illegible]-653(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN, USA (3 - 7 May 1982).

Published in summary form only.

21104 **He bubbles in Ni: a small-angle X-ray scattering study.** Haubold, H.G.; Lin, J.S. (Oak Ridge National Lab., TN (USA). Metals and Ceramics Div.). *Journal of Nuclear Materials;* **111**: 709-714(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN, USA (3 - 7 May 1982).

The bubble distance of 80 A was found to remain unchanged in the concentration range Csub(He) = 0.06 - 1.1%. This indicates a low-dose nucleation with an interbubble distance of about 80 A. At higher doses, the bubbles grow and tend to rearrange themselves in an energetically more favorable 'lattice structure' with ordering mainly on [111]-planes. The bubbles are found to be strongly pressurized with a He pressure p = 300,000 bar for R = 11.7 A. This pressure is estimated to be high enough for a dislocation loop punching mechanism. (111)-plane punching is expected to be energetically most favorable, and to shift the bubble position along the <111>-directions. This could explain the ordering that was observed along [111] for the higher dose. The state of the helium in these bubbles is superdense: $n = 0.18\ A^{-3}$ for bubbles with a radius, R = 11.7 A. This density exceeds that necessary for He to be solid at room temperature.

21105 **Hydrogen ion impact desorption of adsorbed deuterium from stainless steel.** Bastasz, R.; Haggmark, L.G. (Sandia National Labs., Albuquerque, NM (USA). Physical Metallurgy Div.). *Journal of Nuclear Materials;* **111**: 805-808(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN, USA (3 - 7 May 1982).

The removal of adsorbed deuterium for stainless steel by energetic molecular hydrogen ions (H_2^+ and H_3^+) has been studied with secondary ion mass spectrometry. Desorption cross sections for this process range from 1.2 x 10^{-16} cm^2 to 5 x 10^{-17} cm^2 for incident ion energies 0.3 to 1.5 keV/atom. The cross sections increase as the incident ion energy is lowered. At low energies, direct interactions between incident particles and adsorbate atoms appear to be important in causing desorption. Dissociation of molecular hydrogen ions occurs prior to desorption. The implications of these findings with respect to the mechanisms for ion impact desorption and to fuel recycling phenomena in tokamaks are discussed.

21106 **Electron-electron scattering in vanadium.** Gautron, G.J.; Zablocki, J.E.; Hsiang, T.Y.; Weinstock, H.; Schmidt, F.A. (Department of Physics, Illinois Institute of Technology, Chicago, Illinois). *Journal of Low Temperature Physics;* **49**: No. 1, 185-191(1 Oct 1982).

Measurements have made over a range from liquid helium to room temperature of the electrical resistivity of a single crystal of vanadium with residual resistance ratio (RRR) of 1974, the highest ever reported. The data were analyzed in terms of electron-impurity scattering, electron-electron scattering, and electron-phonon interband and intraband scattering. We have obtained a T^2 electron-electron scattering coefficient of (1.6 +- 0.2) x 10^{-11} $\Omega cm/K^2$, in agreement with that obtained earlier in the same laboratory on a crystal with lower purity. Therefore, we conclude that electron-electron scattering does contribute measurably to the electrical resistivity of vanadium at low temperature.

21107 **Vacuum brazing beryllium to Monel.** Glenn, T.G.; Grotsky, V.K.; Keller, D.L. (Rockwell International Corp., Rocky Flats Plant, Golden, CO). *Welding Journal (Miami);* **61**: 334.S-338.S(Oct 1982). (CONF-820449—).

From 63. annual meeting of the American Welding Society; Kansas City, MO, USA (26 Apr 1982).

The tensile strength of beryllium to Monel vacuum furnace brazed joints was studied. The filler used was the 72% Ag-28%Cu(BAg-8) alloy. The strength of these joints, which require the use of a titanium hydride powder or physical vapor deposited titanium wetting agent on the beryllium, was found to approach the yield strength of the base metals. Strength was found to be reduced by the interaction of increased titanium hydride quantity and brazing time. Metallographic and scanning electron microscope (SEM) studies correlated these effects with microstructure. The formation of the brittle copper-beryllium delta phase was found to require conditions of high brazing temperature and the presence of a reservoir of the copper-containing filler such as found in fillet areas. Two other filler metals: pure silver, and a 60% Ag-30% Cu-10%Sn (BAg-17) alloy were shown to be acceptable alternatives to the BAg-8 alloy in cases where the filler metal can be preplaced between the base metal surfaces.

21108 **Production of aluminum metal by electrolysis of aluminum sulfide.** Minh, N.Q.; Loutfy, R.O.; Yao, N.P. US Patent Application 6-364,282. 1 Apr 1982. 19p. Contract W-31-109-ENG-38.

Metallic aluminum may be produced by the electrolysis of Al_2S_3 at 700 to 800°C in a chloride melt composed of one or more alkali metal chlorides, and one or more alkaline earth metal chlorides and/or aluminum chloride to provide improved operating characteristics of the process.

21109 **Gas-tungsten arc welding of aluminum alloys.** Frye, L.D. US Patent Application 6-361,932. 25 Mar 1982. 14p. Contract W-7405-ENG-26.

The present invention is directed to a gas-tungsten arc welding method for joining together structures formed of aluminum alloy with these structures disposed contiguously to a heat-damagable substrate of a metal dissimilar to the aluminum alloy. The method of the present invention is practiced by diamond machining the fay surfaces of the aluminum alloy structures to profice a mirror finish thereon having a surface roughness in the order of about one microinch. The fay surface are aligned and heated sufficiently by the tungsten electrode to fuse the aluminum alloy continguous to the fay surfaces to effect the weld joint. The heat input used to provide an oxide-free weld is significantly less than that required if the fay surfaces were prepared by using conventional chemical and mechanical practices.

21110 Photoelectric determination of work function via CREMSEE enhancement: photo-CREMSEE. Nilges, M.; Freed, J.H. (Cornell Univ., Ithaca, NY). *Chemical Physics Letters;* **85**: No. 5/6, 499-504(29 Jan 1982).

CREMSEE (cyclotron resonance from microwave-induced secondary electron emission), operated at a microwave power level just below threshold for self-sustaining signals may be used as an electron-amplifier and detector of photoelectrons. A determination of the work function of air-oxidized Ag on the interior surface of a uhv-microwave cavity yields 4.06 +- 0.05 eV.

21111 X-ray diffuse scattering from several platinum-atom chain 1-D conductors and a detailed investigation of the solid-state properties of $Rb_3(H_3O)_{0.2}[Pt(CN)_4](O_3SO.H.OSO_3)_{0.5}.0.8H_2O$. Coles, G.S.V. (Technical Univ. of Denmark, Lyngby); Lindegaard-Andersen, A.; Williams, J.M.; Schultz, A.J.; Brown, R.K.; Besinger, R.E.; Ferraro, J.R.; Underhill, A.E.; Watkins, D.M. *Physica Scripta;* **25**: 873-878(1982). Contract W-31-109-ENG-38.

X-ray diffuse scattering studies at room temperature for seven one-dimensional metallic complexes are reported. The crystal structure and the temperature dependence of both the electrical conductivity and x-ray diffuse scattering for $Rb_3(H_3O)_{0.2}[Pt(CN)_4](O_3SO.H.OSO_3)_{0.5}.0.8H_2O$ are reported and related to the development of a non-Peierls superstructure below room temperature. The Rb complex is unique in that it contains a polyatomic (>2) trianion and a ratio of three alkali metal ions per Pt atoms instead of the usual two.

21112 Role of electron scattering in the surface enhanced Raman effect on Ag-Au alloys. Kester, J.J. (Ames Lab., IA); Furtak, T.E. *Solid State Communications;* **41**: No. 6, 457-460(1982). Contract W-7405-ENG-82.

SERS has been observed from AgAu alloys using incident photon energies above and below the onset for interband transitions. Below the onset, electron scattering processes due to alloying cause a decrease in SERS intensity below that observed on either pure metal. This behavior is most easily explained by theories which are based on the optical properties of the substrate.

21113 Grain boundary precipitation in aluminum alloys: effect of boundary structure. Gronsky, R. (Lawrence Berkeley Lab., CA); Furrer, P. *Metallurgical Transactions, [Section] A: Physical Metallurgy and Materials Science;* **12**: 121-127(Jan 1981). Contract W-7405-ENG-48.

A transmission electron microscope study of grain boundary precipitatrion in Al-Zn and Al-Zn-Mg alloys has been conducted with emphasis on the influence of localized boundary structure. Intrinsic grain boundary defects are found to have a significant effect on the precipitation sequence in that they assist the emerging precipitates in establishing a low energy habit plane relationship with at least one bordering grain. Under more extreme conditions of unavailable habits or unfavorable intrinsic structures, extrinsic defects dominate the precipitation reaction.

21114 Pulsed laser mixing of Ni-Au surface films on nickel substrates. Pronko, P.P.; Wiedersich, H.; Seshan, K.; Helling, A.L.; Lograsso, T.A.; Baldo, P.M. (Argonne National Lab., IL). pp 599-606 of Laser and electron-beam solid interactions and materials processing. Gibbons; Hess; Sigmon (eds.). Amsterdam, Netherlands; Elsevier North Holland, Inc. (1981).

The melt phase alloying of Ni-Au films on Ni substrates has been studied for rapid quenches following 35 nano-second Q switched ruby laser pulses (0.69μ wavelength) in the energy regime of 0.5 to 3.0 j/cm^2. The Ni and Au films were each 200 angstroms in thickness having been deposited on a polished Ni substrate by standard hot ribbon vapor deposition methods. Data was obtained on pre and post alloyed surface layers using Rutherford backscattering (RBS) transmission electron microscopy (TEM) and scanning TEM energy dispersive X-ray analysis. The melting and resolidification dynamics of the liquid-solid interface was monitored through finite difference integration of the non-linear heat conduction equation to give temperature profiles, depth of melting and melt front velocities associated with the liquid-solid phase change. Resolidification velocities were typically 15 meters/second with melt depths extending to a few thousand angstroms depending on pulse energy. RBS data confirms that liquid phase diffusion of gold in nickel has occured. TEM analysis reveals the presence of a two phase mixture being composed of nickel rich and gold rich material. Microbeam energy dispersive X-ray analysis indicates the presence of a relatively uniform mixing of these two phases.

21115 Effects of pressure on the mixed valent properties of Ce and its intermetallic compounds. Liu, S.H. (Oak Ridge National Lab., TN). pp 327-333 of Physics of solids under high pressure. Schilling, J.S.; Shelton, R.N. (eds.). Amsterdam, Netherlands; North Holland Publishing Company (1981). Contract W-7405-ENG-26.

The rare earth element Ce and a number of rare earth compounds exhibit valence transition under pressure. This has been one of the most active research topics in recent years. There also exist several intermetallic compounds of Ce that do not undergo abrupt valence changes. Instead, the valence varies continuously with pressure or temperature. A systematic high presure study of these compounds will further elucidate the phenomenon of valence fluctuation. For these materials, the single parameter which is most sensitive to the pressure is the position of the Ce 4f level relative to the conduction bands. Therefore, it should be possible to monitor the valence with pressure and follow the evolvement of the system from a local moment state to a nonmagnetic state. The latter may be a spin compensated Kondo lattice state of a lattice of virtual bound states. The experimental evidence of these exotic states is reviewed and new experiments to investigate their physical properties are suggested.

21116 The parabolic growth of oxide solid solutions on binary alloys: a semiempirical approach. Whittle, D.P. (Lawrence Berkeley Lab., CA); Gesmundo, F.; Viani, F. *Oxidation of Metals;* **16**: No. 1/2, 81-98(1981). Contract W-7405-ENG-48.

The growth of solid solution oxide scales on alloys has been described by considering either the transport of the cations themselves, or that of the defect species in the oxide lattice. The two approaches have been shown to be similar. However, it has become apparent that the simplified defect model implicitly assumed in previous analyses using the ionic transport approach is not adequate to fully describe the variation of ionic diffusivities with oxygen potential or oxide composition. Further analyses, using a combination of the two approaches, are suggested.

3602 Ceramics, Cermets, And Refractories

REFER ALSO TO CITATION(S) 19420, 19422, 19429, 19799, 19824, 19825, 19875, 19929, 20310, 20422, 20611, 20611, 20685, 20686, 20742, 20884, 20887, 21044, 21086, 21116, 22723, 22760, 22760, 22760

21117 (AD-A—111575) Thermo-mechanical and thermal behavior of high-temperature structural materials. Hasselman, D.P.H.; Bentsen, L.D.; Brennan, J.J.; Claussen, N.; Knight, C.E. (Virginia Polytechnic Inst. and State Univ., Blacksburg (USA)). Dec 1981. 179p. NTIS, PC A09/MF A01.

The thermomechanical and thermal behavior of high temperature structural materials wre reported as follows: (1) observations on the characteristics of a fluidized bed for the thermal shock testing of brittle ceramics, (2) effect of delta-T and spatially varying heat transfer coefficient on thermal stress resistance of brittle ceramics measured by the quenching method, (3) analysis of effect of crack interaction on nature of strength loss in thermally shocked brittle ceramics, (4) analysis of thermal fatigue behavior of brittle structural materials, (5) analysis of thermal stresses in a partially absorbing plate asymmetrically heated by cyclic thermal radiation and cooled by convection, (6) anisotropy effects in the thermal diffusivity of Si_3N_4-BN composites, (7) thermal diffusivity of silicon carbide-silicon composites, (8) effect of microcracking on the conduction of heat in brittle composites, (9) measurement of the thermal conductivity and diffusivity of fine silicon carbide fibers by the composite technique, and (10) thermal stress in materials heated internally by radiation absorption.

21118 **(AD-A—116581/0) The role of additives in the densification of nitrogen ceramics. Annual report no. 2 (final).** Jack, K.H. (Newcastle upon Tyne Univ. (UK)). Oct 1979. 97p. NTIS, PC A05/MF A01.

Densification of silicon nitride by either hot-pressing or pressureless sintering requires an additive which reacts with the surface silica and some of the nitride to give an oxynitride liquid that promotes shrinkage and, at the same time, the phase transformation from alpha to beta. Silicon nitride is densified by hot-pressing with scandia additive but theoretical density is not achieved by pressureless sintering. The kinetics of densification are interpreted in terms of a Kingery model with a slope of one-third for the solution-precipitation stage indicating that solution of alpha or precipitation of beta is rate-controlling. Sintering with equal weights of scandia and alumina gives improved densities. An important advantage over beta yttrium sialon is that the quaternary scandium oxynitride and glassy grain boundary phases do not undergo catastrophic oxidation at 1000 C.

21119 **(CONF-820325—13) Stabilities, stoichiometries, and site occupancies in hydrides of intermetallic compounds. Final report.** Westlake, D.G. (Argonne National Lab., IL (USA)). Feb 1982. Contract W-31-109-ENG-38. 13p. NTIS, PC A02/MF A01. Order Number DE83007958.

From International symposium on the electronic structure and properties of hydrogen in metals; Richmond, VA, USA (4 Mar 1982).

In the literature, one can find numerous attempts to explain the observed stabilities, stoichiometries and site occupancies in hydrides of the various families of intermetallic compounds. Some of the approaches to these problems are critically reviewed here. For some, but not all such hydrides, the stabilities have been shown by different researchers to correlate with the enthalpy for formation of the intermetallic compound, itself, or with cell size, or electronic properties, or elastic properties. It appears, therefore, that all of these effects may play a role, but none is dominant in all cases. The development of the procedure for qualitative and quantitative determinations of H-site occupancy from calculations of enthalpies for the formation of imaginary binary hydrides was reviewed. Such inspection raises the question of possible fortuitous agreement between experimental observations and predictions arising from the technique. The concepts of minimum hole size for H occupation and minimum H-H distance in stable hydrides of metals or intermetallic compounds have been discussed in terms of their importance to preferred H sites and to stoichiometry, and considerations necessary to a geometric model have been outlined. The model is used to rationalize observed H sites and stoichiometry of $LaNi_5H$/sub x/. The review points up the need for theoretical treatment leading to fundamental understanding of such systems. 2 figures.

21120 **(CONF-820929—11) Neutron-scattering studies of magnetic superconductors.** Sinha, S.K.; Crabtree, G.W.; Hinks, D.G.; Mook, H.A.; Pringle, O.A. (Argonne National Lab., IL (USA); Oak Ridge National Lab., TN (USA)). 1982. Contract W-31-109-ENG-38. 27p. NTIS, PC A02/MF A01. Order Number DE83007814.

From IUPAP international conference on magnetism; Kyoto, Japan (6 Sep 1982).

Results obtained in the last few years obtained by neutron diffraction on the nature of the magnetic ordering in magnetic superconductors are reviewed. Emphasis is given to studies of the complex intermediate phase in ferromagnetic superconductors where both superconductivity and ferromagnetism appear to coexist.

21121 **(CONF-8206160—1) Impurity diffusion in transition-metal oxides.** Peterson, N.L. (Argonne National Lab., IL (USA)). Jun 1982. Contract W-31-109-ENG-38. 44p. NTIS, PC A03/MF A01. Order Number DE83007617.

From 2. international conference on transport in non-stoichiometric compounds; Perpignan, France (28 Jun 1982).

Intrinsic tracer impurity diffusion measurements in ceramic oxides have been primarily confined to CoO, NiO, and Fe_3O_4. Tracer impurity diffusion in these materials and TiO_2, together with measurements of the effect of impurities on tracer diffusion (Co in NiO and Cr in CoO), are reviewed and discussed in terms of impurity-defect interactions and mechanisms of diffusion. Divalent impurities in divalent solvents seem to have a weak interaction with vacancies whereas trivalent impurities in divalent solvents strongly influence the vacancy concentrations and significantly reduce solvent jump frequencies near a trivalent impurity. Impurities with small ionic radii diffuse more slowly with a larger activation energy than impurities with larger ionic radii for all systems considered in this review. Cobalt ions (a moderate size impurity) diffuse rapidly along the open channels parallel to the c-axis in TiO_2 whereas chromium ions (a smaller-sized impurity) do not. 60 references, 11 figures.

21122 **(DOE/ER/10654—T1) Optical and electrochemical investigation of ruthenium and iridium and their oxides in relation to their electrocatalytic activity. Progress report.** Pollak, F.H. (Brooklyn Coll., NY (USA). Dept. of Physics). Feb 1983. Contract AC02-80ER10654. 46p. NTIS, PC A03/MF A01. Order Number DE83006563.

Large crystals of RuO_2 were grown. Raman spectra and magnetic susceptibility of single-crystal RuO_2 were measured. Preliminary channeling studies were also performed. Electrochemical investigations of single-crystal RuO_2 included cyclic voltammetry, hydrogen adsorption/desorption reactions, potential of zero charge, ad chlorine evolution reaction. A study of the surface structures of RuO_2 (110) and (100) was begun using LEED, AES, and XPS. 20 figures. (DLC)

21123 **(DOE/ER/12069—T1) Experimental test to unify sintering theory. Progress report.** Doremus, R.H.; German, R.M. (Rensselaer Polytechnic Inst., Troy, NY (USA). Dept. of Materials Engineering). 1982. Contract AC02-82ER12069. 8p. NTIS, PC A02/MF A01. Order Number DE83007504.

α-Al_2O_3 was prepared and converted into γ-Al_2O_3 by 1000°C calcination; this gamma powder transformed into alpha upon heating at 1200°C. X-ray diffraction lines were compared with ASTM values for α-Al_2O_3. Sintering of γ-Al_2O_3 was studied. Swelling in sintering of MgO-doped Al_2O_3 was also studied. (DLC)

21124 **(DOE/NBM—3007365) Evaluation of advanced materials. Final report.** Wright, I.G.; Clauer, A.H.; Shetty, D.K.; Tucker, T.R.; Stropki, J.T. (Battelle Columbus Labs., OH (USA)). 18 Nov 1982. Contract W-7405-ENG-26. 171p. NTIS, PC A08/MF A01. Order Number DE83007365.

Cemented tungsten carbides with a binder level in the range of 5 to 6 percent exhibited the best resistance to erosion for this class of materials. Other practical cermet materials were diamond - Si/SiC, Al_2O_3-B_4C-Cr, and B_4C-Co. SiAlON exhibited erosion resistance equivalent to the best WC-cermet. The only coating system to show promise of improved erosion resistance was CVD TiB_2 on cemented TiB_2-Ni. Cracking and/or spalling of a TiC coating and a proprietary TMT coating occurred in the standard slurry erosion test. Ranking of cemented tungsten carbide materials in the laboratory erosion test was the same as that found in service in the Wilsonville pilot plant. Specimens from the Fort Lewis pilot plant which performed well in service exhibited low erosion in the laboratory test. A substitute slurry, was found to be 2 to 4 times more erosive than the coal-derived slurry 8 wt% solids. Ranking of materials in the substitute slurry was nearly identical to that in the coal-derived slurry. Three modes of erosion were: ductile cutting; elastic-plastic indentation and fracture; and intergranular fracture. Erosion of a given material was closely related to its microstructure. In the substitute slurry, the angle-dependence of erosion of two forms of SiC, hot-pressed and sintered, were similar, but the sintered material eroded slower. Laser fusing of preplaced powder mixtures can produce cermet-like structures with potential for erosive and sliding wear resistance. TiC particles in Stellite 6 matrix proved less prone to cracking than WC particles in the same matrix. 74 figures, 14 tables.

21125 (LA-UR—83-367) rf plasma synthesis of ultrafine, ultrapure silicon carbide powder. Hollabaugh, C.M.; Hull, D.E.; Newkirk, L.R.; Petrovic, J.J. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 18p. (CONF-830215—2). NTIS, PC A02/MF A01. Order Number DE83007551.

From International conference on ultrastructure processing of ceramics, glasses and composites; Gainesville, FL, USA (14 Feb 1983).

Ultrafine, ultrapure silicon carbide powder has been produced by reaction of silane and methane in a high temperature rf plasma. Preliminary studies include the effect of gas composition and of powder (plasma temperature) on the stoichiometry of the powder. The carbon-to-silicon ratio of the powder was varied from 1.0 to 1.9 by changing the process conditions. The powder has a BET surface area of 101 m^2/g, which is equivalent to a particle diameter of 18.5 nm. A particle size in the range of 10 to 20 nm was measured by transmission electron microscopy. X-ray diffraction results indicate a domain size of 7.5 nm and a crystal structure of beta (cubic) silicon carbide. Spectrographic analysis shows that metallic impurities are lower than high quality grade commercial powder. Because of the high surface area, the powder must be stored and processed in an inert atmosphere to prevent severe contamination with oxygen.

21126 (LBL—15293) Erosion of hard-metal coatings. Levy, A.; Bakker, T.; Sholz, E.; Azadabeh, M. (Lawrence Berkeley Lab., CA (USA)). Oct 1982. Contract AC03-76SF00098. 42p. (CONF-830317—1). NTIS, PC A03/MF A01. Order Number DE83006747.

From TMS/AIME meeting; Atlanta, GA, USA (6 Mar 1983).

The use of protective coatings on components in fossil-fuel energy processes to provide thermal insulation, corrosion resistance and/or wear resistance is becoming more prevalent. In those applications where small, erosive particles occur in the environment, such as in the use of pulverized coal, erosion behavior of the coating becomes an important design consideration. The erosion of several protective, hard-metal-type coatings and monolithic inserts by particles entrained in an air blast has been investigatd. SiC, Si_3N_4, tungsten carbide, and a series of nickel-chromium-boron alloys were tested at room temperature. The materials were fabricated by chemical vapor deposition, flame spraying, plasma-arc spraying, detonation-gun spraying, melting and brazing, and hot pressing. The effects of composition, morphology, method of facrbrication, thickness, and surface texture on erosion behavior are discussed. The mechanisms of erosion for the different materials are defined and compared. It was determined that the materials had a wide range of erosion resistance with the fine-grain-size and minimum-porosity materials having the lowest erosion rates. All of the materials tested eroded in a brittle manner with essentially no relationship to hardness. 19 figures.

21127 Spin correlations in uranium nitride near the ordering temperature. Holden, T.M.; Buyers, W.J.L.; Svensson, E.C.; Lander, G.H. (Atomic Energy of Canada Limited, Chalk River Nuclear Laboratories, Chalk River, Ontario K0J 1J0, Canada). *Physical Review [Section] B: Condensed Matter;* **26**: No. 11, 6227-6238(1 Dec 1982).

The spin correlations in cubic uranium nitride near the Neel temperature have been measured using two-axis and three-axis crystal spectrometer neutron scattering techniques. The spin correlations are found to be longitudinal in character and are spatially anisotropic. A dynamic scaling model is proposed which incorporates the anisotropy and is found to give a good description of the data. The exponents characterizing the temperature dependence of the inverse correlation length and susceptibility are close to those for the two-dimensional Ising model for T>T/sub N/+4 K. The results are interpreted in terms of strong correlations within {001} sheets with weak correlations between sheets.

21128 Role of elemental mercury in the superconductivity of Hg/sub 3-delta/AsF_6. Schirber, J.E.; Heeger, A.J.; Nigrey, P.J. (Sandia National Laboratories, Albuquerque, New Mexico 87185). *Physical Review [Section] B: Condensed Matter;* **26**: No. 11, 6291-6293(1 Dec 1982).

Pressure-temperature excursions necessary for conversion of rhombohedral α-Hg to body-centered tetragonal β-Hg have been applied to single crystals of Hg/sub 3-delta/AsF_6. The superconducting properties of the compound near 4 K are shown to track those of elemental α- and β-Hg which appear to be trapped within the sample.

21129 Self-consistent electronic structure of lanthanum dihydride and lanthanum trihydride. Misemer, D.K.; Harmon, B.N. (Ames Laboratory, U. S. Department of Energy and Department of Physics, Iowa State University, Ames, Iowa 50011). *Physical Review [Section] B: Condensed Matter;* **26**: No. 10, 5634-5644(15 Nov 1982).

The electronic structures of lanthanum dihydride and trihydride have been evaluated self-consistently using a semirelativistic Korringa-Kohn-Rostoker method. The results indicate a charge transfer to the tetrahedral hydrogen for the dihydride, but no charge transfer to the additional octahedral hydrogen for the trihydride. The energy gap in the trihydride is found to be greatly reduced from the value obtained from non-self-consistent calculations, but otherwise the effects of self-consistency are minor. The results are discussed together with recent experimental and theoretical studies which have focused on the observed metal-semiconductor phase transition.

21130 Neutron scattering investigation of layer-bending modes in alkali-metal—graphite intercalation compounds. Zabel, H.; Kamitakahara, W.A.; Nicklow, R.M. (Department of Physics and Materials Research Laboratory, University of Illinois at Urbana-Champaign, Urbana, Illinois 61801). *Physical Review [Section] B: Condensed Matter;* **26**: No. 10, 5919-5926(15 Nov 1982).

Phonon dispersion curves for low-frequency transverse modes propagating in the basal plane have been measured in the alkali-metal—graphite intercalation compounds KC_8, CsC_8, KC_{24}, and RbC_{24} by means of neutron spectroscopy. The acoustic branches show an almost quadratic dispersion relation at small q, characteristic of strongly layered materials. The optical branches of stage-1 compounds can be classified as either graphitelike branches showing dispersion, or as almost dispersionless alkali-metal-like modes. Macroscopic shear constants C_{44} and layer-bending moduli have been obtained for the intercalation compounds by analyzing the data in terms of a simple semicontinuum model. In stage-2 compounds, a dramatic softening of the shear constant by about a factor of 8 compared with pure graphite has been observed. Low-temperature results on KC_{24} indicate the opening of a frequency gap near the alkali-metal Brillouin-zone boundary, possibly due to the formation of the alkali-metal superstructure.

21131 Magnetic free energy of $ErRh_4B_4$ in paramagnetic and superconducting states. Behroozi, F.; Carbtree, G.W.; Campbell, S.A.; Snider, D.R.; Schneider, S.; Levy, M. (University of Wiscon-Parkside, Kenosha, Wisconsin and Argonne National Laboratory, Argonne, Illonis). *Journal of Low Temperature Physics;* **49**: No. 1, 73-90(1 Oct 1982).

Magnetization curves for a polycrystalline specimen of $ErRh_4B_4$ are analyzed to estimate the paramagnetic contribution to the Gibbs free energy as well as the differences in free energy between the superconducting and normal states. These results are compared with the theoretical predictions of a suitably constrained model based on Ginzburg-Landau theory for magnetic superconductors.

21132 Shock-induced reactivity enhancement of zirconia powders. Hankey, D.L.; Graham, R.A.; Hammetter, W.F.; Morosin, B. (Sandia National Labs., Albuquerque, NM (USA)). *Journal of Materials Science Letters;* **1**: No. 10, 445-447(Oct 1982).

It is the object of this paper to report on an investigation of shock-induced reactivity enhancement of zirconia powders by measuring the change in the ZrO_2-PbO reaction temperature brought about by controlled high pressure shock wave loading of the ZrO_2. This work is thought to provide the first explicit quantitative measure of shock-enhanced solid state reactivity. The as-received and shock-compressed zirconias were characterized using various methods. Surface area was measured using a BET method and phase analysis was performed by X-ray diffraction. Information on crystalline strain introduced in the shock loading process and crystallite size was also obtained from the diffraction patterns. Thermogravimetric analysis (TGA), thermal evolution analysis (TEA), and optical emission spectrographic analysis were employed to detect the presence of impurities which might have been introduced during the shock compression. Experimental details are presented. The results are reported and discussed.

21133 **Pd/SiO$_2$ II. Effects of pretreatment on structure.** Nandi, R.K. (Northwestern Univ., Evanston, IL); Georgopoulos, P.; Cohen, J.B.; Butt, J.B.; Burwell, R.L. Jr.; Bilderback, D.H. *Journal of Catalysis;* 77: No. 2, 421-431(Oct 1982). Contract AC02-77ER04254.

Experiments employing extended X-ray absorption fine structure and wide-angle X-ray diffraction, at the Cornell University High Energy Synchrotron Source, have shown that Pd catalysts of high percentage metal exposed stored in air consist primarily of crystalline PdO. Reduction of these catalysts in hydrogen results in the formation of palladium, whereas similar treatment of catalysts of low percentage metal exposed leads to palladium hydride.

21134 **Certain experimental observations of the responses of PZT65/35 due to domain switching.** Allensworth, D.L.; Chen, P.J. (Sandia National Labs., Albuquerque, NM). *Ferroelectrics;* 40: 65-70(1982). Contract AC04-76DP00789.

The purpose of this work is to determine experimentally the strains and electric displacements associated with domain switching in PZT65/35. In particular, the polar and lateral strains of an essentially cube specimen, viz., the results corresponding to the butterfly loops are measured independently. The responses of the cube specimen are, of course, three dimensional. Comparison of the polar butterfly loop of the cube specimen to that of a disc specimen whose thickness to diameter ratio is quite small indicates that the responses of the disc specimen are also three dimensional. These results also suggest the presence of surface layer effects which are more prominent in the disc specimen.

21135 **Melting phenomena and laser annealing in semiconductors.** Narayan, J. (Oak Ridge National Lab., TN). *Institute of Physics, Conference Series;* No. 60, 101-112(1981). Contract W-7405-ENG-26.

From Microsc. semicond. mater. conference; Oxford, England (6 April 1981).

The work on annealing of displacement damage, dissolution of boron precipitates, and the broadening of dopant profiles in semiconductors after treating with ruby ($\lambda = 0.649$ μm, tau = 15ns, E = 1.0-2.0 Jcm^{-2}), and dye ($\lambda = 0.485$ μm, tau = 9ns, E = 0.7-1.3 Jcm^{-2}) laser pulses is reviewed in order to provide convincing evidence for the melting phenomenon and illustrate the mechanism associated with laser annealing. The nature of the solid-liquid interface and the interface instability during rapid solidification is considered in detail. It is shown that solute concentrations after pulsed laser annealing can far exceed retrograde maxima values. However, there is a critical solute concentration above which a planar solid-liquid interface becomes unstable and breaks into a cellular structure. The solute concentrations and cell sizes associated with this instability are calculated using a perturbation theory, and compared with experimental results.

3603 Composite Materials

REFER ALSO TO CITATION(S) 21078

21136 **(AGARD-LS—124) Practical considerations of design, fabrication and tests for composite materials.** (Advisory Group for Aerospace Research and Development, 92 - Neuilly-sur-Seine (France)). 1982. 201p. NTIS.

The lectures are directed to the practical application of composites to structures. The scope includes a lecture on design considerations involving material selection, fabrication techniques, and tooling concepts. Stress analysis is covered including knockdown factors, load transfer concepts and analytical techniques. The Lecture Series concludes with a lecture on qualification requirements and practical consideration in inspection and testing techniques. These lectures are not geared to the day-to-day developments at the very forefront of technology, but rather to state-of-the-art concepts, techniques, and materials that when combined will assure a high probability of success in achieving design goals for cost as well as weight savings.

21137 **(N—82-14289) Fracture mechanics in fiber reinforced composite materials, taking as examples B/Al and CFRP.** Peters, P.W.M. (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt e.V., Koeln (Germany, F.R.)). 1980. 2p. (In German). NTIS, PC A03/MF A01.

In its Colloq. on Composite Mater. 2 p (SEE N82-14289 05-24) REFS.

The validity of linear elastic fracture mechanics and other fracture criteria was investigated with laminates of boron fiber reinforced aluminum (B/Al) and of carbon fiber reinforced epoxide (CFRP). Cracks are assessed by fracture strength Kc or Kmax (critical or maximum value of the stress intensity factor). The Whitney and Nuismer point stress criterium and average stress criterium often show that Kmax of fiber composite materials increases with increasing crack length however, for B/Al and CFRP the curve showing fracture strength as a function of crack length is only applicable in a small domain. For B/Al, the reason is clearly the extension of the plastic zone (or the damage zone in the case of CFRP) which can not be described with a stress intensity factor. (ESA)

21138 **(NASA-CR—159114) Design, fabrication and test of graphite/polyimide composite joints and attachments for advanced aerospace vehicles.** Cushman, J.B. (Boeing Co., Seattle, WA (USA)). Apr 1981. 47p. NTIS, PC A03/MF A01.

NASA. Langley Research Center. REFS.

Standard and advanced bonded joint concepts were evaluated to develop a data base for the design and analysis of advanced composite joints for use at elevated temperatures (561K (550F)). Design concepts for specific joint applications and the fundamental parameters controlling the static strength characteristics of such joints were identified. Test results are presented for rail shear and sandwich beam compression tests and tension tests of moisture conditioned specimens and bonded on T sections. Coefficients of thermal expansion data are presented for A7F (LARC 13 Amide-imide modified) adhesion. Static discriminator test results for type 1 and type 2 bonded and bolted preliminary attachment concepts are presented and discussed.

21139 **(NASA-CR—165051) Analysis of crack propagation as an energy absorption mechanism in metal matrix composites.** Adams, D.F.; Murphy, D.P. (Wyoming Univ., Laramie (USA)). Feb 1981. 159p. NTIS, PC A08/MF A01.

The crack initiation and crack propagation capability was extended to the previously developed generalized plane strain, finite element micromechanics analysis. Also, an axisymmetric analysis was developed, which contains all of the general features of the plane analysis, including elastoplastic material behavior, temperature-dependent material properties, and crack propagation. These analyses were used to generate various example problems demonstrating the inelastic response of, and crack initiation and propagation in, a boron/aluminum composite.

21140 **(NASA-CR—165753) Thermomechanical response of gr/pi composites. Final report, 1 October 1979-30 March 1981.** Rosen, B.W.; Nagarkar, A.P.; Hashin, Z. (Materials Sciences Corp., Blue Bell, PA (USA)). Mar 1981. 93p. NTIS, PC A05/MF A01.

The effects of temperature changes upon the stresses and strains in composite laminates having carbon fibers in a polyimide matrix were evaluated. Composites having laminae in which there were nonlinear stress-strain relations for stresses transverse to the fibers and for axial shear stresses were treated. Material properties were considered to be temperature dependent. Separately, the effects of laminae viscoelastic response were also treated. The results suggest that, for this material, nonlinearities due either to stress or time dependent effects do not appear to be of major practical importance for conventional high temperature composite structures.

21141 **(NASA-TM—82749) Durability/life of fiber composites in hygrothermomechanical environments.** Chamis, C.C.; Sinclair, J.H. (National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center). 1981. 28p. NTIS, PC A03/MF A01.

Presented at the Sixth Conf. on Composite Mater.: Testing and Design sponsored by the Am. Soc. for Testing and Mater., Phoenix, Ariz., 12-13 May 1981.

Statistical analysis and multiple regression were used to determine and quantify the significant hygrothermomechanical variables which infuence the tensile durability/life (cycle loading, fatigue) of boron-fiber/epoxy-matrix (B/E) and high-modulus-fiber/epoxy-matrix (HMS/E) composites. The use of the multiple regression analysis reduced the variables from fifteen, assumed initially, to six or less with a probability of greater than 0.999. The reduced variables were used to derive predictive models for compression an intralaminar shear durability/life of B/E and HMS/E composites assuming isoparametric fatigue behavior. The predictive models were subsequently generalized to predict the durability/life of graphite-fiber-r generalized model is of simple form, predicts conservative values compared with measured data and should be adequate for use in preliminary designs.

21142 **(NASA-TM—83209) Preliminary analysis of accelerated space flight ionizing radiation testing.** Wilson, J.W. (Old Dominion Univ.); Stock, L.V. (Christopher Newport Coll.). (National Aeronautics and Space Administration, Hampton, VA (USA). Langley Research Center). Jan 1982. 19p. NTIS, PC A02/MF A01.

REFS.

A preliminary analysis shows that radiation dose equivalent to 30 years in the geosynchronous environment can be accumulated in a typical composite material exposed to space for 2 years or less onboard a spacecraft orbiting from perigee of 300 km out to the peak of the inner electron belt (approximately 2750 km). Future work to determine spacecraft orbits better tailored to materials accelerated testing is indicated. It is predicted that a range of 10 to the 9th power to 10 to the 10th power rads would be accumulated in 3-6 mil thick epoxy/graphite exposed by a test spacecraft orbiting in the inner electron belt. This dose is equivalent to the accumulated dose that this material would be expected to have after 30 years in a geosynchronous orbit. It is anticipated that material specimens would be brought back to Earth after 2 years in the radiation environment so that space radiation effects on materials could be analyzed by laboratory methods.

21143 **(UCRL—88513) Processing, cure reactions, network structure and mechanical properties of TGDDM/DDS epoxies.** Morgan, R.J.; Happe, J.A.; Mones, E.T. (Lawrence Livermore National Lab., CA (USA)). Dec 1982. Contract W-7405-ENG-48. 13p. (CONF-830408—1). NTIS, PC A02/MF A01. Order Number DE83004804.

From 28. national Society for the Advancement of Materials Process Engineers symposium; Anaheim, CA, USA (12 Apr 1983).

Diaminodiphenyl sulfone (DDS) cured tetraglycidyl 4,4′ diaminodiphenyl methane (TGDDM) epoxies are the most-common composite matrices utilized in high-performance fibrous composites. Our recent studies on the characterization of these epoxies from the processing and durability viewpoints are described. The effects of DDS concentration, BF_3:$NH_2C_2H_5$ catalyst composition, TGDDM impurities, and prepreg mixing conditions on the processing of the composite, cure reactions, and the resultant chemical and physical structure of TGDDM-DDS epoxies are presented. 8 figures.

21144 **Transport in simple liquids and dense gases: kinetic mean-field theory and the KAC limit.** Karkheck, J.; Stell, G.; Martina, E. (State Univ. of New York, Stony Brook). pp 150-157 of Proceedings of the eighth symposium on thermophysical properties. Volume 1. Thermophysical properties of fluids. New York, NY; American Society of Mechanical Engineers (1982).

Maximization of entropy is used in conjunction with the BBGKY hierarchy to obtain a closed one-particle kinetic equation. For an interparticle potential of hard-sphere core plus smooth attractive tail, this equation contains a hard-core collision integral, identical to that of the revised Enskog theory, plus a mean-field term which is linear in the tail strength. The thermodynamics contained therein leads directly to the now-standard statistical-mechanical methods to construct a state-dependent effective hard-core potential in relation to a more realistic potential. These methods induce an extension of the transport coefficients to the Lennard-Jones potential. Predictions of the resulting transport theory compare very favorably with thermal conductivity and shear viscosity experimental results for real simple liquids and dense gases, and also with molecular dynamics simulation results. Poor agreement between theory and experiment is found for moderately dense and dilute gases. The kinetic theory also contains an entropy functional and an H-theorem is proven. Extension to mixtures is straightforward and the Kac-limit is discussed in detail.

3604 Polymers And Plastics

REFER ALSO TO CITATION(S) 19900, 19977, 20582, 20587, 20592, 21060, 21077, 21248, 21276, 21277

21145 **(DOE/ER/10922—2) Microstructural analysis of ion-containing polymers. Progress report, January 1-December 31, 1982.** Cooper, S.L. (Wisconsin Univ., Madison (USA). Dept. of Chemical Engineering). Feb 1983. Contract AC02-81ER10922. 24p. NTIS, PC A02/MF A01. Order Number DE83008080.

The authors' proposed explanation of the small-angle x-ray scattering of ionomers was compared to the depleted zone core-shell model in its ability to fit the data for the sulfonated polystyrene ionomers. The new model, which attributes the scattering peak to inter-aggregate interference is superior in several respects and the resulting parameters are reasonable and consistent with the known compositions of the samples. The examination of the local ionic aggregate structure by extended x-ray-absorption fine-structure spectroscopy has indicated a number of differences among ionomer systems. Although transition-metal cations are universally surrounded by a well-ordered coordination sphere of oxygen atoms, the alkali-metal cations exhibit no such structure. In the well-dried sulfonated polystyrene and Surlyn samples, a second shell is observed which is probably due to sulfur and carbon atoms in the two materials, respectively. Such a structure is never observed in the Nafions, although under certain conditions, a second shell of neighboring cations is observed. 4 figures, 5 tables.

21146 **Time-dependent small-angle x-ray scattering from stress-induced crazes in polymers.** Rothwell, W.S; Martinson, R.H.; Gorman, R.L. (Lockheed Palo Alto Research Laboratory, 3251 Hanover Street, Palo Alto, California 94304). *Applied Physics Letters;* **42**: No. 5, 422-424(1 Mar 1983).

High-intensity x radiation from the Stanford Synchrotron Radiation Laboratory storage ring has been used in a small-angle scattering mode to study dynamic deformation behavior in polymers. Complete scattering curves were obtained as a function of time during relaxation with the strain direction oriented parallel and perpendicular to the plane of measurement. Interpretation is made of the resulting information on relative number, size, and time dependence of heterogeneities. A tentative model proposes that the application of stress starts a rapid creation of approximately uniform spherical voids which migrate and coalesce to form crazes and relieve the stress.

3606 Other Materials

REFER ALSO TO CITATION(S) 19800, 19817, 19916, 19993, 19994, 19995, 19996, 19997, 20694, 20877, 21086, 21099, 21105, 21434, 21570, 21623

21147 **(AD-A—110508) InP materials.** Iseler, G.W. (Massachusetts Inst. of Tech., Lexington (USA). Lincoln Lab.). Sep 1981. 28p. NTIS, PC A03/MF A01.

REFS.

The improvement of the yield of high purity polycrystalline InP as source material for crystal growth and the optimization of the liquid encapsulated Czochralski (LEC) method to grow crystals with low dislocation density and uniform dopant concentration was undertaken. Reproducible twin free growth in the lower gradient by modifying the pulling rod and its rotation mechanism to reduce system vibration was obtained. An X-ray topography and CO_2 laser transmission show that doped LEC crystals contain prominant growth striations, probably produced by random convection currents in the melt, that are associated with abrupt changes in dopant concentration. Infrared transmission at 10.6 microns was measured on p-type InP samples to determine the free carrier absorption due to holes. It is found that the absorption cross section is much higher for holes than for electrons.

21148 **(AD-A—120156/5) Potential for high temperature superconductivity. Final report Apr 80-Oct 81.** Reynolds, D.C.; Chung, Y.; Nam, S.B. (Air Force Wright Aeronautical Labs., Wright-Patterson AFB, OH (USA)). Jul 1982. 39p. (AFWAL-TR—82-1031). NTIS, PC A03/MF A01.

The investigation of Cu Cl at high pressure revealed magnetic anomalies that were characteristic of a superconducting state. Subsequent to these investigations similar effects were observed in pressure quenched CdS. These preliminary results were very promising, though considerably more work was required to confirm the mechanism as well as to gain a better understanding of the materials that exhibit the desired properties. In view of these observations an LDF program was initiated, the goal of which was to reproduce some of the magnetic anomalies and to try to understand something of the mechanism as well as what properties the materials needed to demonstrate the effect. The initial investigations were very devoted to Cu Cl since more was known about the high temperature diamagnetic anomaly in this material than any other material. Pressure cells were constructed and a variable temperature Dewar was obtained so the magnetic properties could be investigated over a temperature to liquid helium temperature. The necessary equipment was assembled to measure the diamagnetic and paramagnetic susceptibilities. Cu Cl crystals were grown from the melt from the vapor phase and by a flux technique. The first experiments that were done were optical experiments designed to characterize the starting material as well as to obtain information relating to the material properties that might relate to the mechanisms involved. From high resolution emission experiments a center was observed that could be then center from which the superconducting electrons are supplied as predicted by theory. Studies were made on pressure quenched CdS where both diamagnetic and paramagnetic anomalies were observed.

21149 **(ANL/NESC—267R) WATER; steam tables at 14.5-14,500 psia and 32-472°F.** Coffman, W.A.; Lynn, L.L. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048267.

The largest errors for enthalpy, specific heat, specific volume, and thermal conductivity occur near the saturation curve, especially near the critical point. The largest error in viscosity occurs at low temperatures .

WATER is a subroutine used to extract thermodynamic and transport properties of liquid, vapor, and supercritical water by tabular interpolation over the range of states: 14.5 to 14,500 psia and 32 to 1472 degrees F. These properties are specific volume, specific enthalpy, dynamic viscosity, and thermal conductivity, tabulated for pressure and temperature conditions.CDC6600; FORTRAN IV; BKSB; The storage required for the property data is 2877 locations. Total storage requirement is about 4000 locations. There are no tape requirements.

21150 **(ANL/NESC—294R) M0899;hoh; steam tables 14.5-2538 psia.** Lynn, L.L. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048294.

By making calls on a subroutine called HOH, M0899 edits thermodynamic and transport properties of water over the range 14.5 to 2538 psia and up to 608 degrees Fahrenheit below saturation and 932 degrees Fahrenheit above saturation.CDC6600; FORTRAN IV; SCOPE 2.0; On the CDC6600 a FORTRAN IV compiler plus about 3000 storage locations for subroutine HOH and 10,000 locations for the main program.

21151 **(ANL/NESC—300) SAFE-CREEP; viscoelastic analysis of concrete.** De Arriaga, F. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048300.

SAFE-CREEP performs a viscoelastic analysis of plane or axisymmetric composite concrete structures with age- and temperature-dependent creep data.UNIVAC1108; FORTRAN IV; 65K memory and 13 tapes.

21152 **(ANL/NESC—396R) WASP2; water properties for safety analysis.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy, J.H.; Feher, T.R. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048396.

The WASP2 procedures are restricted to be within a pressure range from below atmospheric to near critical for saturation states and for single phase vapor, and to over 10,000 psia for single phase liquid. The temperature range is approximately 40 degrees F to 650 degrees F for the liquid and from saturation temperature to approximately 2200 degrees F for the vapor region.

WASP2 is a FORTRAN IV computer program which performs a spline function fit to data obtained from the WASP subprogram (see reference 1) for thermodynamic and transport properties of water and steam. The properties calculated by WASP2 are: pressure and temperature as functions of specific volume and specific internal energy; specific volume as a function of pressure and enthalpy; and viscosity, thermal conductivity, and specific heat as functions of pressure and temperature.CDC6600,7600; FORTRAN IV; SCOPE 3.3 (CDC6600), SCOPE 1.1 (CDC7600); The WASP2 procedure requires 200,000 (octal) words of CDC7600 large core memory (LCM) for storing the coefficients for the spline functional fit of the water and steam surfaces..

21153 **(ANL/NESC—869) THERPP; thermodynamic properties hydrocarbons.** Deeds, R.S. (EG and G Idaho, Inc., Idaho Falls (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048869.

With its current dimensioning, THERPP can handle grid sizes up to 30x30, for mixtures containing up to 15 components. Fluids for which the program has been tested are methane, ethane, propane, isobutane, n-butane, isopentane, n-pentane, n-heptane, n-octane, ethylene, propylene, nitrogen, carbon dioxide and hydrogen sulfide. .

THERPP computes thermodynamic properties of light hydrocarbons and mixtures of light hydrocarbons. Properties can be generated in the form of either a pressure-temperature grid or a pressure-enthalpy grid.CDC7600;IBM360,370,303x; FORTRAN IV; SCOPE 2.1 (CDC7600), OS/360 (IBM360), OS/370 (IBM370,303x); 36,000 (octal) words of memory are necessary for execution of the CDC7600 version and 155K bytes for execution of the IBM360 version. The IBM and CDC conversion programs require 45K bytes and 5,000 (octal) words of memory, respectively.

21154 **(ANL/NESC—886) EQ3/6; chemical equilibrium of aqueous systems.** Wolery, T.J. (Lawrence Livermore National Lab., CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048886.

Calculations are allowed in the temperature interval 0-350 degrees C, at either 1 atm-steam saturation pressures or a constant

500 bars. The activity coefficient approximations for aqueous solutes limit modeling to solutions of ionic strength less than about one molal.

The EQ3/6 version .2055U software computes thermodynamic equilibrium models for aqueous solution-mineral systems. It consists of two main programs, EQ3 and EQ6. EQ3 performs distribution-of-species calculations for natural water compositions; EQ6 uses the results of EQ3 to predict the consequences of heating and cooling aqueous solutions and of irreversible reaction in rock-water systems. The programs can be used to study such phenomena as the formation of ore bodies, scaling and plugging in geothermal development, and the long-term disposal of nuclear waste.CDC7600;CRAY1; FORTRAN Extended 4.6 (CDC7600) and CFT (CRAY1); SCOPE 2 (CDC7600); About 45,000 (octal) words of SCM and 58,000 (octal) words of LCM are required on a CDC7600 for EQ3, about 125,000 (octal) words of SCM and 32,000 (octal) words of LCM for EQ6. Four units in addition to the standard input/output units are used by EQ3, ten units in addition to the standard I/O units by EQ6.

21155 (BDX—613-2713) Nontoxic polyimides. Final report. Jamieson, D.R. (Bendix Corp., Kansas City, MO (USA)). Jan 1983. Contract AC04-76DP00613. 32p. NTIS, PC A03/MF A01. Order Number DE83006933.

A unique bismaleimide resin, termed APO-BMI, used as a binder in the fabrication of syntactic foam parts, was developed using nontoxic raw materials. APO-BMI may be used in compression molding and mold-to-size applications. 7 figures, 7 tables.

21156 (CONF-821107—50) Mechanical stability of a Cm-doped celsian glass-ceramic. Roubort, J.L.; Offermann, P.; Matzke, H. (Commission of the European Communities, Karlsruhe (Germany, F.R.). European Inst. for Transuranium Elements; Hahn-Meitner-Institut fuer Kernforschung Berlin G.m.b.H. (Germany, F.R.)). Oct 1982. Contract W-31-109-ENG-38. 9p. NTIS, PC A02. Order Number DE83007862.

From 6. international symposium on the scientific basis for radioactive waste management; Boston, MA, USA (1 Nov 1982).

The Hertzian indentation technique has been used to measure the fracture properties of a celsian glass-ceramic (B1-3) developed for high-level waste storage. For spherical glass indentors of radii, $R \leqq 5$ mm the load required to form ring cracks is proportional to R and intersects the origin, confirming Auerbach's law. The measurements are analyzed and result in a fracture toughness, K/sub IC/ = 1.3 MNm/sup -3/2/. For $R > 5$ mm flaw statistics cause a deviation from the ideal behavior of Auerbach's law. Spontaneous failure due to radiation was not observed, on the contrary, the self-radiation damage caused by recoiling Pu atoms resulting from α-decay of a ^{244}Cm doped sample to a dose of about 1.5 x 10^{19} α-decays/cm^3 increases K/sub IC/ by at least 25%. This increase in toughness is probably caused by the internal stresses which result from disordering due to the radiation damage. This is confirmed by the broadening of the x-ray spectra as the result of self-radiation. Annealing a damaged sample at high temperatures produces fracture presumably by the coalescence of helium bubbles.

21157 (CONF-8107103—1) ^{127}I Moessbauer study of Chevrel-phase superconductors $Mo_6X_6I_2$ (X = S,Te). Subba Rao, G.V.; Niarchos, D.; Shenoy, G.K.; Cashion, J.D.; Hinks, D.; Umarji, A.M.; Janaki, S. (Argonne National Lab., IL (USA); Indian Inst. of Tech., Madras). 1981. Contract W-31-109-ENG-38. 12p. NTIS, PC A02/MF A01. Order Number DE83007593.

From International conference on the applied Mossbauer spectroscopy; Kashmir, India (13 Jul 1981).

The Chevrel-phase compounds $Mo_6X_6I_2$ (X = S,Te) exhibit very interesting superconducting behvior. The transition temperatures dramatically increase in both Mo_6X_8 structures be replacing 2 of the X atoms with iodine atoms. This enhancement in superconducting behavior is closely related to the number of electrons on the Mo_6 cluster in these compounds. The iodine atoms in these compounds preferentially occupy the 2c sites while the remaining X atoms occupy the 6f sites. We have performed the Moessbauer effect measurements using the 57.6-keV transition in ^{127}I to evaluate the charge on the iodine. Assuming the charge on S to be -2, the experimental value of nearly -1 charge on iodine leaves 22.3 electrons per Mo_6 cluster which is close to that predicted in $SnMo_6S_8$). In $Mo_6Te_6I_2$, assuming Te to have nearly -1 charge, we obtain 28.3 electrons per Mo_6 cluster. The observation of superconductivity in this compound then reflects a significantly distinct band structure of tellurides compared to those of sulphides. The quadrupole interactions at the odine nucleus in $Mo_6S_6I_2$ and $Mo_6Te_6I_2$ are small but have opposite signs signifying bonding differences between these compounds.

21158 (DOE/ER/10390—5) Investigation of deep level defects in epitaxial semiconducting. Progress report, June 15, 1982-June 14, 1983. Wessels, B.W. (Northwestern Univ., Evanston, IL (USA)). 15 Feb 1983. Contract AC02-79ER10390. 72p. NTIS, PC A04/MF A01. Order Number DE83007523.

Optical deep level transient spectrosopy (DLTS) on doped, undoped and irradiated ZnSe was performed. Doping of ZnSe with nitrogen resulted in the formation of relatively shallow acceptor states as determined by DLTS. This is the first direct electrical evidence for shallow acceptor states in ZnSe. N-n heterojunctions fabricated from the ZnSe/GaAs epitaxial layers had built-in voltages different from the theoretically predicted values.

21159 (DOE/ER/10438—7) Study of the formation of surface films: critical conditions for growth. Progress report, June 1, 1982-May 31, 1983. Smith, F.W. (City Coll., New York (USA). Dept. of Physics). Jan 1983. Contract AC02-79ER10438. 9p. NTIS, PC A02/MF A01. Order Number DE83005821.

Significant results obtained during the last year (January to December 1982) from our experimental study of the critical conditions for the growth of surface films on silicon and on tantalum are presented. The study of the oxidation of the Si(111) and (100) surfaces using H_2O as oxidant have been essentially completed. Significant progress has been made on a study of the enhancement of the oxidation of silicon at high substrate doping levels. We are working on a theoretical model to explain these results. In addition, preliminary results have been obtained on the interaction of H_2O with polycrystalline Ta foils.

21160 (DOE/ER/10444—6) Infrared-absorption spectrum of free carriers in polar semiconductors. Progress report, July 1, 1982-June 30, 1983. Jensen, B. (Boston Univ., MA (USA)). Jan 1983. Contract AC02-79ER10444. 16p. NTIS, PC A02/MF A01. Order Number DE83007975.

An analytical expression for the real part of the refractive index n near the fundamental absorption edge has been calculated for a semiconductor in terms of experimentally known quantities. It is derived from a quantum-mechanical claculation of the complex dielectric constant which assumes the band structure of the Kane theory. The expression obtained is a function of band-gap energy, effective electron and heavy hole masses, the spin-orbit splitting energy, the lattice constant, and the carrier concentration for n-type or p-type materials. The refractive index at the absorption edge is found as a function of the material parameters above. This enables one to express theoretical results in terms of basic material parameters only, with no adjustable constants. The dispersion near the fundamental absorption edge which has been observed experimentally for a number of III-V and II-VI compounds is predicted and its calculation enabled. This is expected to have applications for designing in areas such as integrated optics, where the optical functions of light generation, guiding, coupling, modulation, and detection must be obtainable in a single semiconductor material and depend on a knowledge of the refractive index. Comparison of theory with available experimental data is given for a number of III-V and II-VI binary compounds. The extension to ternary and quaternary materials is discussed.

21161 (DOE/ER/10444—7) Dispersion of the refractive index near the absorption edge in compound semiconductors. Jensen, B.; Torabi, A. (Boston Univ., MA (USA). Dept. of Physics). 1982. Contract AC02-79ER10444. 17p. (CONF-821170—1). NTIS, PC A02/MF A01. Order Number DE83007501.

From Conference on laser induced damage in optical materials; Boulder, CO, USA (15 Nov 1982).

An analytical expression for the real part of the refractive index n near the fundamental absorption edge has been calculated for a semiconductor in terms of experimentally known quantities. It is derived from a quantum mechanical calculation of the complex dielectric constant which assumes the band structure of the Kane theory. The expression obtained is a function of band gap energy, effective electron and heavy hole masses, the spin orbit splitting energy, the lattice constant, and the carrier concentration for n-type or p-type materials. The refractive index is given as a function of frequency and the basic material parameters listed above with no adjustable constants. Dispersion near the fundamental absorption edge, which has been observed experimentally for a number of III-V and II-VI compounds, is predicted and its calculation enabled. Comparison of theory with available experimental data is given.

21162 (DOE/ER/13004—1) Light-scattering studies of lower-dimensional colloidal-particle and critical-fluid systems. Progress report, August 1, 1982-July 31, 1983. O'Sullivan, W.J.; Mockler, R.C. (Colorado Univ., Boulder (USA)). Feb 1983. Contract AC02-82ER13004. 11p. NTIS, PC A02/MF A01. Order Number DE83007420.

We have extended the theoretical description of the lattice excitations in crystals formed of charged colloidal particle suspensions (CCPS) to include the effects of bounding surfaces. One of the new features that arises in a CCPS crystal confined by surfaces to form a film, is that propagating lattice waves cannot exist at the center of the Brillouin zone. Techniques have been developed to form systems of colloidal particles in monolayers on a water surface and on membranes. Transitions from gas to liquid to two dimensional solid phases have been observed in both classes of system. The two dimensional solid phases range from single crystals having a hexagonal lattice with long range translational order, to hexatic forms with short range translational order and long range orientation order, to amorphous or glass-like of /sub 2,6/lutidine + water have been extended to a film of thickness 0.5 μm. The dynamical critical behavior of this film remains strictly three dimensional to within 2 mK of the extrapolated critical point, where an apparent first order transition occurs.

21163 (N—8228445) Ion beam sputter deposited diamond like films. Banks, B.A.; Rutledge, S.K. (National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center). 1982. 18p. (NASA-TM—82873; E—1249). NTIS, PC A02/MF A01.

A single argon ion beam source was used to sputter deposit carbon films on fused silica, copper, and tantalum substrates under conditions of sputter deposition alone and sputter deposition combined with simultaneous argon ion bombardment. Simultaneously deposited and ion bombarded carbon films were prepared under conditions of carbon atom removal to arival ratios of 0, 0.036, and 0.71. Deposition and etch rates were measured for films on fused silica substrates. Resulting characteristics of the deposited films are: electrical resistivity of densities of 2.1 gm/cu cm for sputter deposited films and 2.2 gm/cu cm for simultaneously sputter deposited and Ar ion bombarded films. For films approximately 1700 A thick deposited by either process and at 5550 A wavelength light the reflectance was 0.2, the absorptance was 0.7, the absorption coefficient was 67,000 cm to the -1 and the transmittance was 0.1.

21164 (NASA-CASE-NPO—15530-1) A method of increasing minority carrier lifetime in silicon web or the like. Liu, J.K.; Schwuttke, G.H.; Koliwad, K.M. (Jet Propulsion Lab., Pasadena, CA (USA)). Mar 1982. 10p. NTIS, PC A02/MF A01.

A silicon dendrite is grown as a ribbon forming two silicon layers which are separated by an interface layer which contains a certain large number of defects. Significant increase of minority carrier lifetime with homogeneous distribution at the outer surfaces of the two silicon crystal layers are achieved by processing the web in an atmosphere of a selected gas, e.g., oxygen, nitrogen, or an inert gas, for about 30 minutes to several hours, at a temperature preferably on the order of 900 to 1200 C.

21165 (PNL-SA—8737) MCC-1: a standard leach test for nuclear waste forms. Strachan, D.M.; Turcotte, R.P.; Barnes, B.O. (Pacific Northwest Lab., Richland, WA (USA)). May 1981. Contract AC06-76RL01830. 16p. (CONF-800987—4). NTIS, PC A02/MF A01. Order Number DE83002695.

From Workshop on comparative leaching behavior of radioactive waste forms; Argonne, IL, USA (3 Sep 1980).

A Materials Characterization Center has been established by the Department of Energy at the Pacific Northwest Laboratory. This paper briefly describes five proposed standard leach tests and describes typical results using the MCC-1 static test. For the borosilicate glass studied (PNL-76-68), five-fold replicate experiments show that errors in elemental leach values are usually less than +-10%. Regular time dependent leach curves are obtained, and no significant difference is observed between pure water and simulated silicate/bicarbonate groundwater results. Leaching in salt brine is quite different, especially as shown by elemental depth profiles in the solid which show significant Mg penetration into the gel layer from the brine solution.

21166 (SAND—82-2810C) Electronic properties of superlattices. Osbourn, G.C. (Sandia National Labs., Albuquerque, NM (USA)). 1982. Contract AC04-76DP00789. 20p. (CONF-821219—3). NTIS, PC A02/MF A01. Order Number DE83003709.

From International conference on metastable and modulated semiconductor structures; Pasadena, CA, USA (6 Dec 1982).

The electronic properties of semiconductor superlattices can be intentionally varied by changing their quantum well structures, i.e., by changing their layer thicknesses and their layer alloy compositions. New flexibility in varying superlattice electronic properties occurs in strained-layer superlattices, since lattice-mismatched materials can be used for the individual layers. The flexible choice of layer materials and layer thicknesses in strained-layer superlattices makes possible the tailoring of various superlattice electronic properties to desired values. Calculated values for several adjustable material properties in ternary strained-layer superlattices are presented to illustrate this tailorability. The potential advantages of new types of superlattices with more complicated unit cells are also discussed.

21167 (SAND—82-2986C) Melt depth and regrowth kinetics in pulsed laser annealing of silicon and gallium arsenide. Galvin, G.J.; Thompson, M.O.; Mayer, J.W.; Peercy, P.S.; Hammond, R.B. (Sandia National Labs., Albuquerque, NM (USA); Cornell Univ., Ithaca, NY (USA). Dept. of Materials Science; Los Alamos National Lab., NM (USA)). 1983. Contract AC04-76DP00789. 6p. (CONF-830123—1). NTIS, PC A02/MF A01. Order Number DE83005192.

From SPIE meeting on laser processing of semiconductor devices; Los Angeles, CA, USA (1 Jan 1983).

High-intensity pulsed laser irradiation of semiconductor materials results in ultrafast melting and resolidification of a thin surface layer. An experimental probe has been developed based on the discontinuous change in electrical conductivity of a semiconductor material upon melting. Real time monitoring of the dynamics of pulsed laser melting and resolidification can be obtained by transient electrical conductance measurements. Melting velocities from 5 to 200 m/s and resolidification velocities of 1 to 20 m/s have been observed in silicon with this technique. Simultaneous measurement of the optical reflectance provides additional complementary information on laser melting dynamics. Data from both electrical conductance and optical reflectance measurements is presented for silicon and gallium arsenide. The real time experimental data provide strong evidence for a simple thermal model for melting and resolidification during nanosecond pulsed laser annealing. 9 figures.

21168 (SAND—83-1098C) Relationships between the sol-to-gel and gel-to-glass conversions. Brinker, C.J.; Scherer, G.W. (Sandia National Labs., Albuquerque, NM (USA); Corning Glass Works, NY (USA)). 1983. 32p. (CONF-830215—1). NTIS, PC A03/MF A01. Order Number DE83007032.

From International conference on ultrastructure processing of ceramics, glasses and composites; Gainesville, FL, USA (14 Feb 1983).

Multicomponent gels were prepared with a wide range of pH- water combinations so that the skeletal structure of the desiccated gels varied from being less highly (low pH, low H_2O) to more highly (high pH, high H_2O) polymerized. The apparent value of isothermal viscosity, determined by isothermal shrinkage experiments, was found to increase with time, presumably due to polymerization and structural relaxation of the skeletal framework. This increase was dramatic (>200X) for less highly polymerized gels but was found to occur in all cases, and it therefore is predicted to be a general property of metal alkoxide-derived gels.

21169 (UCID—19684) Equation of state data of APC 2.5. Mitchell, A.C.; Nellis, W.J.; Trainor, R.J. (Lawrence Livermore National Lab., CA (USA)). 7 Feb 1983. Contract W-7405-ENG-48. 13p. NTIS, PC A02/MF A01. Order Number DE83002170.

Equation of state measurements have been made on APC 2.5 to a pressure of 124 GPa (1.24 Mbar). The data include single- and double-shock Hugoniot measurements, ultrasonic properties, and chemical analysis. 3 tables, 2 figures.

21170 Transient photoconductivity studies of the light soaked state of hydrogenated amorphous silicon. Street, R.A. (Xerox Palo Alto Research Center, Palo Alto, California 94304). *Applied Physics Letters;* **42**: No. 6, 507-509(15 Mar 1983). Contract AC02-77CH00178.

Studies of transient photoconductivity show that the primary effect of light soaking in hydrogenated amorphous silicon is to introduce dangling bonds of bulk density 10^{16}—10^{17} cm^{-3}. Light soaking reduces the μtau product of both electrons and holes to values which are quantitatively related to the observed increase in the dangling bond electron spin resonance (ESR) spin density. In addition, no change in the carrier drift mobilities is detected after light soaking.

21171 Laser-controlled etching of chromium-doped <100> GaAs. Tisone, G.C.; Johnson, A.W. (Sandia National Laboratories, Albuquerque, New Mexico 87185). *Applied Physics Letters;* **42**: No. 6, 530-532(15 Mar 1983). Contract AC04-76DP00789.

The photocontrolled etching of <100> Cr:GaAs in HNO_3 is examined in the wavelength region of 334—514 nm with an Ar ion laser. The etching rate decreases with increasing wavelength and correlates with the optical absorption coefficient in the GaAs. The etching process is found to be photochemically and not thermally controlled. Etch rates for the UV are 30(μ/s)/(MW/cm²) for laser intensities between 3 and 80 kW/cm².

21172 Melt dynamics of silicon-on-sapphire during pulsed laser annealing. Thompson, M.O.; Galvin, G.J.; Mayer, J.W.; Peercy, P.S.; Hammond, R.B. (Department of Material Science, Cornell University, Ithaca, New York 14853). *Applied Physics Letters;* **42**: No. 5, 445-447(1 Mar 1983). Contract AC04-76DP00789.

Transient electrical conductance measurements have been made on 0.45-μm silicon-on-sapphire during pulsed laser annealing with 25-ns ruby irradiation. The photoconductive contribution to the transient current was sufficiently small that the entire melt and resolidification process could be directly observed. The technique yields quantitative measures of melt depths, melting velocities (5—13 m/s), and solidification velocities (2.8—3.3 m/s). Combined with the complementary techniques of time-resolved reflectivity, energy transmission, and calorimetric energy absorption, transient conductance provides a powerful new diagnostic for investigating melt dynamics.

21173 Flame annealing of arsenic and boron implanted silicon. Narayan, J.; Young, R.T. (Solid State Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Applied Physics Letters;* **42**: No. 5, 466-468(1 Mar 1983). Contract W-7405-ENG-26.

We have investigated the characteristics of flame annealing of ion implantation damage in (100) and (111) silicon substrates using transmission electron microscopy and Van der Pauw measurements. The temperature of the hydrogen flame ranged from 1050 to 1200 °C and the interaction time from 5 to 10 s. Transmission electron microscopy studies showed that a "defect-free" annealing could be achieved with concomitant full electrical activation of dopants. The Hall mobility of flame annealed specimens was found to be comparable to pulsed laser annealed specimens.

21174 Submicron multifilamentary high performance Nb_3Sn produced by powder metallurgy processing of large powders. Otubo, J.; Pourrahimi, S.; Zhang, H.; Thieme, C.L.H.; Foner, S. (Francis Bitter National Magnet Laboratory and Plasma Fusion Center, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139). *Applied Physics Letters;* **42**: No. 5, 469-471(1 Mar 1983).

Powder metallurgy processed submicron multifilamentary Nb_3Sn superconducting wires were fabricated starting with 250—500-μm-diam powders. A multiple strand bundling procedure was used to simulate large scale production with actual areal reductions greater than 10^6 to achieve submicron fibers. Both external tin and tin core processing were successful. Typical Cu-36 wt.% Nb-Sn materials gave overall critical current densities of 8×10^4 A/cm² at 12 T, 3×10^4 A/cm² at 14 T, and 6×10^3 A/cm² at 16 T. These results demonstrate that particle size and billet size can be scaled from earlier laboratory scale to large scale fabrication to produce high performance materials.

21175 Electron spin echo envelope modulation study of lithium nuclear hyperfine and quadrupole coupling in the A(Ti—Li) center of α-quartz. Isoya, J.; Bowman, M.K.; Norris, J.R.; Weil, J.A. (Department of Chemistry, University of Saskatchewan, Saskatoon, Saskatchewan, S7N 0W0 Canada). *Journal of Chemical Physics;* **78**: No. 4, 1735-1746(15 Feb 1983).

Computerized microwave pulse generation and detection with subsequent Fourier transformation of electron spin echo envelope modulation spectra has been used to measure the small /sup 6,7/Li nuclear superhyperfine and quadrupole splittings of a lithium-compensated titanium(3+) center in single crystal α-quartz. Comparison of the ^{7}Li hyperfine matrices A-bar determined from standard cw-EPR and from ESEEM show excellent agreement. The precision is better by an order of magnitude for the latter, with uncertainties on the order of one part in a thousand. Use of a three-dimensional display technique yielded the relative sign of matrices A-bar and Q-bar for ^{7}Li.

21176 (UCRL-Trans—11817) Laser phosphate glasses. Alekseev, N.E.; Gapontsev, V.P.; Zhabotinskii, M.E.; Kravchenko, V.B.; Rudnitskii, Yu.P. (Lawrence Livermore National Lab., CA (USA)). Jan 1983. Contract W-7405-ENG-48. Translation of Lazernye fosfatnye stekla; Izdatel'stvo, Nauka, Moscow, USSR, 1980. (VAAP/SA—82/35). 476p. NTIS, PC A21/MF A01. Order Number DE83007517.

This book gives a detailed description of the physical properties of effective new laser materials - phosphate glasses doped with rare-earth ions, and demonstrates the possibilities and prospects for their use in various types of lasers. Data are presented on the structure of phosphate glasses, and on the spectral-fluorescence, lasing, thermooptical, and nonlinear optical characteristics of laser phosphate glasses doped with Nd^{3+} ions. The book examines processes of energy transfer and fluorescence quenching in phosphate glasses, and the sensitization of fluorescence in glasses coactivated (codoped) with Nd^{3+}-Yb^{3+} and Yb^{3+}-Er^{3+} ions. There are 113 figures, 47 tables, and 545 bibliographic entries.

21177 Larson et al. respond:. Larson, B.C.; White, C.W.; Noggle, T.S.; Mills, D.M. (Solid State Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Physical Review Letters;* **49**: No. 24, 1799(13 Dec 1982).

A reply to the comment on synchrotron x-ray diffraction study of silicon during pulsed-laser annealing is presented.(AIP)

21178 Spin dynamics of a model singlet ground-state system. Youngblood, R.W.; Aeppli, G.; Axe, J.D.; Griffin, J.A. (Brookhaven National Laboratory, Upton, New York 11973). *Physical Review Letters;* **49**: No. 23, 1724-1727(6 Dec 1982). Contract AC02-76CH00016.

Inelastic neutron scattering has been used to study the spin dynamics of LiTb/sub p/Y/sub 1-p/F_4, an induced-moment ferromagnet in which the lowest crystal-field levels of the Tb^{3+} ions are two singlets. For p = 0.38, magnetic excitons are observed which obey the dispersion relation given by mean-field theory. In addition, there is a resolution-limited peak at zero energy transfer which is not accounted for within conventional mean-field theory. For p = 0.97, this central peak is also observed, but no magnetic excitons are seen.

21179 Magnetic-resonance investigation of the ordering in randomly-site-diluted antiferromagnets: $KMnF_3$:Mg. D'Ariano, G.; Borsa, F. (Istituto di Fisica dell'Universita e Gruppo Nazionale di Struttura della Materia del Consiglio Nazionale delle Ricerche, 27100 Pavia, Italy). *Physical Review* [*Section*] *B: Condensed Matter;* **26**: No. 11, 6215-6226(1 Dec 1982). Contract W-7405-ENG-82.

Measurements of ^{19}F NMR in a series of polycrystalline mixed paramagnetic compounds KMn/sub x/Mg/sub 1-x/F_3 with x varying over the whole concentration range have been performed as a function of temperature. The paramagnetic shift and the linewidth and relaxation time of the three NMR lines corresponding to those distinct classes of ^{19}F nuclei that have different numbers of nearest-neighbor magnetic ions were measured as the temperature approaches the transition temperature. The paramagnetic shifts of fluorine nuclei having one and two nearest-neighbor Mn ions compare well with the predictions of a simple random-molecular-field (RMFA) approach. It is shown that the substitution of Mn with Mg modifies locally the nuclear-electron transferred hfs interaction by about 20%. The linewidth of the two lines increases drastically as T/sub N/ is approached. The attempt to explain the data by utilizing Moriya's theory rescaled in the RMFA framework fails completely, indicating that the dynamic effects should be treated in real space. The antiferromagnetic ordering was monitored by measuring the rf susceptibility in zero external magnetic field. It is found that the antiferromagnetic transition is broadened by the concentration gradients present in the samples. The average transition temperature was determined as a function of the average concentration, and the results are compared with the theoretical predictions of recent calculations. Good agreement is found if one takes into account the concentration dependence of the exchange coupling constant.

21180 Shear modulus measurements on classical monolayer systems. Abraham, B.M.; Miyano, K.; Xu, S.Q.; Ketterson, J.B. (Argonne National Laboratory, Argonne, Illinois 60439). *Physical Review Letters;* **49**: No. 22, 1643-1646(29 Nov 1982).

The responses to shear of monomolecular films of stearyl alcohol ($C_{18}H_{37}OH$) and nonadecanoic acid ($C_{18}H_{37}COOH$) spread on water were studied as a function of density. A static shear modulus appears at a phase transition, previously assigned as the liquid-solid transition. The value of the modulus, however, is several orders of magnitude lower than the Kosterlitz-Thouless prediction.

21181 Auger line-shape analysis of the structure of hydrogenated amorphous silicon. Zajac, G.; Bader, S.D. (Materials Science Division, Argonne National Laboratory, Argonne, Illinois 60439). *Physical Review* [*Section*] *B: Condensed Matter;* **26**: No. 10, 5688-5693(15 Nov 1982). Contract W-31-109-ENG-38.

Calculated Si $L_{23}VV$ Auger line shapes are presented for five realistic structural models of hydrogenated amorphous silicon (a-Si:H), based on the local-electronic-structure calculations of Ching, Lam, and Lin. The calculated Auger spectra show peak shifts of the main Si $L_{23}M_{23}M_{23}$(pp) transition up to 6 eV, and distinct line shapes dependent on the H-bonding configuration. Comparison of the calculated spectra to the experimental work of Allie et al. on sputtered a-Si:H clearly shows an expected increased prominence of the $L_{23}M_1M_{23}$(sp) term relative to the $L_{23}M_{23}M_{23}$(pp) term, due to the Si 3s localization upon hydrogenation. The results indicate that valuable structural information is available from Auger spectroscopy for this interesting system.

21182 Activation enthalpy, Gibbs free energy, and entropy for conduction in Na β''-alumina. Wang, J.C. (Solid State Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Physical Review* [*Section*] *B: Condensed Matter;* **26**: No. 10, 5911-5918(15 Nov 1982). Contract W-7405-ENG-26.

The temperature-dependent activation enthalpy ΔH, Gibbs free energy ΔG, and entropy ΔS for the vacancy conduction in Na β''-alumina were extracted from the conductivity data. The value of ΔH calculated from the equation $\Delta H = -d\ln(\sigma T)/d(1/kT)$ decreases from ~0.03 eV at low T to roughly-equal0.03 eV at high T in a form that can be correlated to the decrease of vacancy ordering on a superlattice reported from diffuse x-ray scattering studies. This T variation in ΔH requires a T variation in ΔS according to the thermodynamic relation $d\Delta S/dT = (1/T)d\Delta H/dT$. By setting the integration constant to be zero, the value of ΔS was found to decrease from ~7k (10^{-22} J/K) at low T to ≃0 at high T. As a result, the activation free energy $\Delta G = \Delta H\text{-}T\Delta S$ is much smaller than ΔH at low T. The results are consistent with the calculated small activation energy for diffusion of a single vacancy (~0.02 eV) and the assignment of a low-frequency (~30-cm^{-1}) Raman peak to the attempt mode for diffusion.

21183 Ion-induced release of deuterium from carbon. Wampler, W.R.; Myers, S.M. (Sandia National Labs., Albuquerque, NM (USA)). *Journal of Nuclear Materials;* **111**: 616-621(Nov-Dec 1982). Contract AC04-76DP00789.

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN, USA (3 - 7 May 1982).

The ion-induced release of deuterium from carbon was studied by first implanting carbon targets with a high fluence of low-energy (150-600 eV) deuterium to saturate a thin near-surface region and then bombarding the targets with higher-energy ions which penetrate through the deuterium implanted region. Measurements were made of the deuterium release caused by bombardment by hydrogen and helium ions at 3 keV, by helium and carbon ions at 30 keV and by carbon ions at 60 keV. A strong correlation is observed between the ion-induced release rate and the energy lost to atomic collisions by the incident ions. A model for the ion-induced release is described which includes retrapping of the deuterium. Two features of this model are that retrapping results in a non-exponential dependence of the release on incident ion fluence, and in a dependence of the release on the thickness of the deuterium implanted layer. Both of these features are observed in the data which indicates that ion-induced release of deuterium from carbon involves retrapping.

21184 Smectic-A—C transition in three dimensions. Grinstein, G.; Pelcovits, R.A. (IBM Thomas J. Watson Research Center, P. O. Box 218, Yorktown Heights, New York 10598). *Physical Review* [*Section*] *A: General Physics;* **26**: No. 4, 2196-2217(Oct 1982).

A theory of the smectic-A—C transition in which fluctuations in both the elastic and director degrees of freedom are treated is developed. It is argued that in zero magnetic field the asymptotic critical behavior belongs in the universality class of the three-dimensional XY model, in agreement with earlier studies which did not treat fully both elastic and director fluctuations. For most experimental situations the true critical region is unobservably narrow whereupon a simple-harmonic approximation adequately describes the transition; in this approximation the static structure factor exhibits a crossover from algebraic decay charaterized by a nonuniversal exponent eta/sub A/ in the A phase to algebraic decay characterized by a different nonuniversal exponent eta/sub A/C at the critical temperature T/sub c/. The splay elastic constant K_1 is $< \infty$ and $= \infty$ in the A and C phases, respectively, but does not exhibit diverging pretransitional fluctuations in the A phase even arbitrarily neare T/sub c/; it jumps discontinuously at T/sub c/. A strong magnetic field stabilizes long-range positional order in both the A and C phase. There is, nevertheless, no long-range order at T/sub c/ where the density correlation function <m(x)m(o)> decays algebraically; schematically, <m(x)m(o)>~x/sup() -2+eta/ at T/sub c/ in th harmonic theory, while m(x) vanishes like t/sup β/, where t is the reduced temperature. The exponent beta/ and eta, though nonuniversal, satisfy the scaling law 4/beta/ = 2+eta.

These finite-field results are modified at large distances (say x> or approx. =15/sup 5/ A) by the inclusion of anharmonic terms. We find <m(x)m(o)>approx.x/sup() -2+etavertical-barlnk/ at T/sub c/, while <m(x)>approx.t/sup beta-tildevertical-barlnt/ as t/right arrow/0.

21185 X-ray-induced transient attenuation at low temperatures in polymer clad silica (PCS) fibers. Barnes, C.E.; Wiczer, J.J. (Sandia National Labs., Albuquerque, NM). pp 25-34 of Feber optics in adverse environments. Bellingham, WA; Society of Photo-Optical Instrumentation Engineers (1982). Contract AC04-76DP00789.

A set of eight polymer clad silica (PCS) fibers from Quartz and Silice with varying water content, cladding thickness, and cladding material type have been exposed to 50 nsec wide X-ray pulses at different temperatures (-45°C, -25°C, 0°C, +25°C) in order to study the effect of fiber parameters and temperature on the extent of X-ray induced transient attenuation at typical LED wavelengths (820 nm, 900 nm, 940 nm, 1060 nm). The results indicate that, relative to other fiber parameters, the presence of water suppresses the transient attenuation in these fibers especially at the longer wavelengths and lower temperatures. Both the peak transient attenuation, α/sub p/, and the normalized transient attenuation, α(t)/α/sub p/, increased with decreasing temperature as one might expect for thermally-limited recovery processes. The peak transient attenuation also increased with decreasing wavelength, with the wavelength dependence being stronger in the wet fibers. Within the limits of this experiment, the cladding characteristics had no effect on the fiber response to irradiation. Thus, in spite of the fact that the presence of water leads to greater intrinsic fiber attenuation between 900 nm and 1000 nm, its presence is beneficial to low temperature fiber behavior in an ionizing environment.

21186 Neutron scattering study of the phase transition in s-trizine at high pressure. Eckert, J.; Fincher, C.R. Jr.; Heilmann, I.U. (Brookhaven National Lab., Upton, NY). *Solid State Communications;* **41**: No. 11, 839-842(1982). Contract AC02-76CH00016.

The elastic transition in s-triazine ($C_3N_3H_3$) from a trigonal (R anti 3c) high temperature (low pressure) structure to a monoclinic (C2/c) low temperature (high pressure) phase has been investigated at pressures up to 5 kbar using neutron scattering techniques. Neutron diffraction was used to measure the pressure dependence of the order parameter and inelastic scattering to study the softening of the transverse acoustic phonon modes on three isotherms. In both cases the effect of pressure on the transition is found to be described primarily by that on the temperature of the transition.

21187 Thermal study of types of water associated with clinoptilolite. Knowlton, G.D. (Arizona State Univ., Tempe); McKague, H.L.; White, T.R. *Clays and Clay Minerals;* **29**: No. 5, 403-411(1981).

The identification and quantification of the water associated with powdered clinoptilolite and clinoptilolite-bearing tuffs were made using thermogravimetric, vacuum gravimetric, and differential scanning calorimetric techniques. Inflection points on thermogravimetric curves at approximately 80° and 170°C correspond to changes in the proportions of externally adsorbed water to loosely bound zeolite water and loosely bound zeolitic water to tightly bound zeolitic water, respectively. These three types of water can be differentiated by temperatures and heats of dehydration obtained from differential scanning calorimetry. These temperatures and heats of hydration are 75 +- 10°C and 59.2 +- 5.9 kJ/mole H_2O, 171 +- 2°C and 58.7 +- 6.1 kJ/mole H_2O, and 271 +- 4°C and 78.7 +- 7.0 kJ/mole H_2O for external water, loosely bound water, and tightly bound water, respectively. The ratio of loosely bound zeolitic water to tightly bound zeolitic water determined in this study is similar to that reported in the literature from structural determinations, indicating that the desorption properties of clinoptilolite are determined by the specific positions of the water molecules in the structure.

21188 Neutron scattering study of the soft mode in the strongly anisotropic antiferromagnet $RbFeCl_3$. Yoshizawa, H. (Univ. of Tokyo, Japan); Axe, J.D.; Shirane, G. *Solid State Communications;* **38**: No. 3, 241-243(1981). Contract AC02-76CH00016.

The softening of the magnetic excitations in a strongly anisotropic S = 1 antiferromagnet, $RbFeCl_3$ is reported. As T is lowered towards T/sub N/, the softening occurs in a small region around q = 0 and the gap energy vanishes according to the power law Δ ca (T - T/sub N/)$^{0\ 7}$. This effect is interpreted using Lines' correlated-effective-field theory applied to a singlet ground state system.

21189 Role of electron attachment in the breakdown strength of gaseous dielectrics. Christophorou, L.G.; Mathis, R.A.; James, D.R.; McCorkle, D.L. (Oak Ridge National Lab., TN). *Journal of Physics D: Applied Physics;* **14**: 1889-1901(1981). Contract W-7405-ENG-26.

Experimental data on electron attachment and breakdown voltages V/sub s/ for two groups of strongly electron attaching gases - perfluorocarbons and freons (haloethanes and halomethanes) - and some of their mixtures with electron slowing-down gases have been used in an effort to quantify the role of electron attachment on the breakdown strength of gases. The perfluorocarbons (PFCS) considered have positive electron affinities (EAS) and capture electrons at thermal and near-thermal energies principally nondissociatively. The freons capture slow electrons dissociatively producing mainly Cl^-. It was concluded that the V/sub s/ is strongly influenced by the magnitude and energy dependence of the attachment cross-section, σ/sub a/(ϵ). The increase in V/sub s/ with increasing attachment, however, seems to saturate, indicating an upper limit in V/sub s/ of ~ 2.5 times that of SF_6. Electron detachment seems to be indicated for PFCS and SF_6. Besides σ/sub a/(ϵ) and EA, electron scattering at low energies is most significant. N_2 shows excellent synergism with electron attaching additives whose σ/sub a/(ϵ) are large at thermal energies, while polar gases are better with electron attaching additives whose σ/sub a/(ϵ) are large to energies well in excess of thermal. These behaviours could be related to the angular distributions of the scattered electrons from N_2 and the polar molecules.

40 CHEMISTRY

REFER ALSO TO CITATION(S) 21687

21190 (CONF-821106—25) Fluid bed consisting of fluid-bed units: a new fluidization method. Kono, H.O. Hwang, J.J. (Institute of Gas Technology, Chicago, IL (USA)). 1982. 41p. Institute of Gas Technoloy, 3424 South State Street, Chicago, IL 60616.

From Annual meeting of heat transfer and energy conversion; Los Angeles, CA, USA (14 Nov 1982).

A new fluidization has been developed that would substantially improve the performance of a fluid bed by installing special internal structures and by dividing the bed vertically into several fluid bed units. Through experimentation the following characteristics are found: the fluid bed can be divided into well stabilized fluid bed units at high superficial gas velocities; the holdup particles in each unit can be determined by the superficial gas velocity and by the design of the internal structure; and the dispersion coefficients of the gas back mixing in the vertical direction are about 10% of the dispersion coefficients in the conventional fluid bed.

21191 (DOE/ER/10645—9) Multivariable internal model control. Garcia, C.E.; Morari, M. (Wisconsin Univ., Madison (USA). Dept. of Chemical Engineering). 1982. Contract AC02-80ER10645. 59p. (CONF-821106—27). NTIS, PC A04/MF A01. Order Number DE83007320.

From Annual meeting of heat transfer and energy conversion; Los Angeles, CA, USA (14 Nov 1982).

Although Pontryagin, Bellman and Kalman developed a revolutionary framework for the optimization of control system performance, only an insignificant number of applications to practical problems has taken place in the chemical process industries. Internal Model Control (IMC), whose fundamentals are described, can close this gap by offering as good a performance as can be achieved by an optimal controller in a package which is more transparent and therefore more appealing to the practitioner.

4001 Analytical And Separations Chemistry

REFER ALSO TO CITATION(S) 19483, 19561, 19565, 19566, 19566, 19667, 19796, 19807, 19833, 19898, 20279, 21295, 21744, 21789, 21901

21192 **(ANL/NESC—919) SALE; analytical chemistry quality control.** Bush, W.J.; Gentillon, C.D. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048919.

Up to 1500 pieces of data for each nuclear material sampled by a maximum of 75 laboratories may be analyzed.

The Safeguards Analytical Laboratory Evaluation (SALE) program is a statistical analysis program written to analyze the data received from laboratories participating in the SALE quality control and evaluation program. The system is aimed at identifying and reducing analytical chemical measurement errors. Samples of well-characterized materials are distributed to laboratory participants at periodic intervals for determination of uranium or plutonium concentration and isotropic distributions. The results of these determinations are statistically evaluated and participants are informed of the accuracy and precision of their results.IBM360,3033; FORTRAN IV (97%) and Assembly language (3%); OS/360; 380K bytes of memory are required for execution.

21193 **(BLL-WH—489-(9091.9F)) Process for the removal of oxides of nitrogen and the aqueous solution used.** (British Library, Boston Spa. Lending Div.). Oct 1981. 18p. Avail: British Library Lending Div., Boston Spa, Engl.

Transl. into ENGLISH of Japanese Patent with the German Patent no. 26-58-548.

A technique for removing the oxides of nitrogen from off-gases by a gas-liquid contact process is described. The off-gas is brought into contact with an aqueous solution containing an ion or compound with a reductive action on the oxides of nitrogen. The solution used contains water and (1) at least one hydrazine compound (selected from the group: hydrazine, hydrazine hydrate and salts of inorganic acids of hydrazine (2) a bivalent or trivalent iron ion and (3) an organic compound suitable for forming a chelate compound with the iron ion or an alkali metal salt of the organic compound.

21194 **(CONF-810346—2) Environmental analyses: application of computer-controlled chromatography.** Stetter, J.R. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 5p. NTIS, PC A02/MF A01. Order Number DE83007781.

From Instrument Society of America symposium; St Louis, MO, USA (23 Mar 1981).

An instrumental approach to chemical analysis and data manipulation has been developed. Major emphasis is placed on computer-controlled chromatographic instrumentation for the isolation, identification, and quantification of individual chemical species. Of particular significance is the analysis of trace organic chemicals, with special emphasis on organics exhibiting biological activity. Samples from complex environmental matrices are collected, prepared for analysis by liquid chromatography, and analyzed by computer-controlled gas chromatography and mass spectroscopy. Improved instrumentation for collecting representative samples from the atmosphere, process streams, and wastewater streams is contributing to the success of this effort.

21195 **(CONF-811037—6) Applications of nuclear reaction analysis for determining hydrogen and deuterium distribution in metals.** Altstetter, C.J. (Illinois Univ., Urbana (USA)). 1981. Contract AC02-76ER01198. 11p. NTIS, PC A02/MF A01. Order Number DE83006974.

From TMS/AIME fall meeting on advanced techniques for the characterization of hydrogen in metals; Louisville, KY, USA (11 Oct 1981).

The use of ion beams for materials analysis has made a successful transition from the domain of the particle physicist to that of the materials scientist. The subcategory of this field, nuclear reaction analysis, is just now undergoing the transition, particularly in applications to hydrogen in materials. The materials scientist must locate the nearest accelerator, because now he will find that using it can solve mysteries that do not yield to other techniques. 9 figures

21196 **(CONF-811160—5) Improved procedure for extraction of aromatic bases from synfuel materials.** Boparai, A.S.; Haugen, D.A.; Schneider, J.F. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 15p. NTIS, PC A02/MF A01. Order Number DE83007681.

From US Department of Energy workshop on chemical characterization of hazardous substances in synfuels; Seattle, WA, USA (4 Nov 1981).

The present study was undertaken to evaluate the conventional aqueous acidbase extraction procedures and to explore alternate conditions for optimizing recovery of aromatic bases. For four procedures the recoveries were measured for 13 components in a mixture containing phenols, polynuclear aromatic hydrocarbons(PAH), primary aromatic amines (PAA), and azaarenes (AA) representative of the types of compounds found in synfuel materials. The results demonstrated that recoveries of hydrophobic 3 to 5 ring PAA and AA can be dramatically increased by using methanol as a cosolvent. The modified procedure is highly efficient for extraction of larger PAA and AA, and does not lead to emulsions when extracting samples of coal-derived materials. 2 figures, 2 tables.

21197 **(CONF-8203115—1) Role of phosphorus in lunar samples: a chemical study.** Jovanovic, S.; Reed, G.W. Jr. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 26p. NTIS, PC A03/MF A01. Order Number DE83007816.

From 13. lunar and planetary conference; Houston, TX, USA (15 Mar 1982).

The roles played by phosphorus present in lunar material may be important in understanding the evolution of the crustal rocks. Quantitative extraction of phosphorus and trace elements associated with possible phosphate phases is the ultimate objective of these studies. Because P may be present in glassy or microcrystalline mesostasis and also as discrete phosphate minerals and as phosphides, chemical procedures provide a tool for its determination along with its complements of trace elements. In these experiments 0.1 M acid was used as a phosphate-specific agent. One experiment was designed to measure how quantitatively P-related constituents are extracted. In consecutive leaching steps more p and REE were dissolved, 76 vs 26% P and 64 vs 37% Sm, from the finer grain sample split. This could be a grain size effect or it could be due to phase separations. Only small amounts of soluble phases remained after the initial 10 minute extraction. Phosphorus and REE are dilute acid soluble in amounts ranging up to 70%. They have sympathetically but are not necessarily highly correlated. Acid soluble fractions of KREEP-rich breccia 14312 and highland breccia 66095 matrix and melt rock clast have chondrite normalized REE patterns similar to that of apatite from a terrestrial gabbro. A different pattern is observed for mare basalt 75055 whole rock and pyroxene and an ilmenite-rich separate. The residues after the acid leach are always HREE enriched relative to the leached fractions. No KREEP-like REE/CH pattern was observed. A systematics for highland rocks based on P_2O_5 and Al_2O_3 is noted. Igneous KREEP rock 15386 and Apollo-16, Fe-rich, high-P_2O_5 glasses reported by Powell et al. (1975) play key roles. 5 figures, 1 table.

21198 **(DOE/ER/13002—T1) Selective metal-ion extraction for multiple metal-ion liquid-liquid exchange reactions. Progress report, February 1, 1982-January 31, 1983.** Tavlarides, L.L. (Syracuse Univ., NY (USA). Dept. of Chemical Engineering and Materials Science). Feb 1983. Contract AC02-82ER13002. 24p. NTIS, PC A02/MF A01. Order Number DE83007972.

Thermodynamic chemical equilibria models and chemical kinetics for the system copper-iron-acid sulfate solutions extracted by β-alkenyl-8-hydroxy quinoline in xylene are studied. Equilibrium extraction data were obtained for the iron-acid-sulfate β-alkenyl-8-hydroxy quinoline-xylene system. A preliminary model which includes the aqueous phase equilibria is being tested to model the data. Kinetic experiments have been completed on the above system for the forward reaction with the liquid jet recycle reactor. It has been determined that the iron-chelation complex is FeR_3 by the method of continuous variation. Kinetic models based on various mechanisms are being tested to describe the data. A one-liter two phase flow reactor system has been developed for the study of extraction efficiencies.

21199 (INIS-mf—7499, pp vp) **Application of lanthanum fluoride in sample preparation for alpha spectrometric determination of plutonium.** Hoelgye, Z. (Ustav Hygieny Prace v Uranovem Prumyslu, Pribram (Czechoslovakia)). 1980. (In Czech). .

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

Published in summary form only.

21200 (INIS-mf—7499, pp vp) **Separation of radiostrontium from radionuclide mixes in milk using cobalt dicarbolide.** Koprda, V.; Scasnar, V. (Slovenska Akademia Vied, Bratislava (Czechoslovakia). Ustav Experimentalnej Farmakologie). 1980. (In Slovak). .

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

Published in summary form only.

21201 (INIS-mf—7500, pp vp) **Investigation of the chemical composition of iron meteorites by neutron-activation analysis.** Kolesov, G.M.; Zaslavskaya, N.I. (AN SSSR, Moscow. Inst. Geokhimii i Analiticheskoj Khimii); Mastalka, A.; Frana, J. (Ceskoslovenska Akademie Ved, Rez. Ustav Jaderne Fyziky). [nd]. .

From 6. Czechoslovak spectroscopic conference; Nitra, Czechoslovakia (1 Sep 1980).

Published in summary form only.

21202 (INIS-mf—7500, pp vp) **Comparison of group separation techniques using NaI(Tl) and Ge(Li) spectrometry for trace elements determination in biological materials by neutron activation analysis.** Kucera, J. (Ustav Jaderneho Vyzkumu CSKAE, Rez (Czechoslovakia)); de Goeij, J.J.M.; Kroon, J.J. (Interuniversitair Reactor Inst., Delft (Netherlands)). [nd]. .

From 6. Czechoslovak spectroscopic conference; Nitra, Czechoslovakia (1 Sep 1980).

Published in summary form only.

21203 (INIS-mf—7500, pp vp) **Use of mass spectrometry in analysis of organic dyes and dye intermediates.** Matousek, P. (Research Institute for Organic Syntheses, Pardubice-Rybitvi (Czechoslovakia)). [nd]. .

From 6. Czechoslovak spectroscopic conference; Nitra, Czechoslovakia (1 Sep 1980).

Published in summary form only.

21204 (INIS-mf—7500, pp vp) **Determination of trace elements in hair of newborn children and their mothers by instrumental neutron activation analysis.** Obrusnik, I. (Ustav Jaderneho Vyzkumu CSKAE, Rez (Czechoslovakia)); Skrivanek, O.; Umlaufova, M. (District Institute of National Health, Chomutov (Czechoslovakia)). [nd]. .

From 6. Czechoslovak spectroscopic conference; Nitra, Czechoslovakia (1 Sep 1980).

Published in summary form only.

21205 (INIS-mf—7500, pp vp) **Use of neutron activation analysis for the proof of a nonprofessional exposure of population to arsenic.** Simkova, M. (Ustav Jaderneho Vyzkumu CSKAE, Rez (Czechoslovakia)). [nd]. .

From 6. Czechoslovak spectroscopic conference; Nitra, Czechoslovakia (1 Sep 1980).

Published in summary form only.

21206 (INIS-mf—7500, pp vp) **Absolute detectability of the wave length and energy dispersive X-ray microanalysis.** Svejcar, J.; Rek, A.; Stransky, K.; Stransky, L. (Vysoke Uceni Technicke, Brno (Czechoslovakia)). [nd]. .

From 6. Czechoslovak spectroscopic conference; Nitra, Czechoslovakia (1 Sep 1980).

Published in summary form only.

21207 (INIS-mf—7500, pp vp) **Computer methods in mass spectrometry.** Schlanger, J. (Vyzkumny Ustav pro Farmacii a Biochemii, Prague (Czechoslovakia)). [nd]. .

From 6. Czechoslovak spectroscopic conference; Nitra, Czechoslovakia (1 Sep 1980).

Published in summary form only.

21208 (INIS-mf—7500, pp vp) **Principles and analytical applications of field ionization and field desorption mass spectrometry.** Schulten, H.R. (Bonn Univ. (Germany, F.R.). Inst. fuer Physikalische Chemie). [nd]. .

From 6. Czechoslovak spectroscopic conference; Nitra, Czechoslovakia (1 Sep 1980).

Published in summary form only.

21209 (INIS-mf—7500, pp vp) **Determination of trace impurities in palladium by neutron activation analysis.** Sterlinski, S.; Maleszewska, H.; Szopa, Z.; Dybczynski, R. (Institute of Nuclear Research, Warsaw (Poland)). [nd]. .

From 6. Czechoslovak spectroscopic conference; Nitra, Czechoslovakia (1 Sep 1980).

Published in summary form only.

21210 (INIS-mf—7500, pp vp) **X-ray fluorescence analysis of phosphate rocks.** Wankova, J.; Knob, B.; Moudry, F. (Vyzkumny Ustav Anorganicke Chemie, Usti nad Labem (Czechoslovakia)). [nd]. .

From 6. Czechoslovak spectroscopic conference; Nitra, Czechoslovakia (1 Sep 1980).

Published in summary form only.

21211 (INIS-mf—7500, pp vp) **Analysis of deuterium by mass spectrometry.** Birkenfeld, H. (Akademie der Wissenschaften der DDR, Leipzig. Zentralinstitut fuer Isotopen- und Strahlenforschung). [nd]. .

From 6. Czechoslovak spectroscopic conference; Nitra, Czechoslovakia (1 Sep 1980).

Published in summary form only.

21212 (INIS-mf—7500, pp vp) **Spark ion source mass spectrometry in the Central Institute for Isotope and Radiation Research, Leipzig: methods and applications.** Hartmann, G. (Akademie der Wissenschaften der DDR, Leipzig. Zentralinstitut fuer Isotopen- und Strahlenforschung). [nd]. .

From 6. Czechoslovak spectroscopic conference; Nitra, Czechoslovakia (1 Sep 1980).

Published in summary form only.

21213 (INIS-mf—7500, pp vp) **Physico-chemical characteristics of plasmachemical reactions.** Borossay, J.; Szepes, L. (Eoetvoes Lorand Tudomanyegyetem, Budapest (Hungary). Szervetlen es Analitikai Kemiai Intezet). [nd]. .

From 6. Czechoslovak spectroscopic conference; Nitra, Czechoslovakia (1 Sep 1980).

Published in summary form only.

21214 **(K/ET—5033) Comparison of analytical methods for percent phosphorous determination in electroless nickel plate.** Owens, W.W.; Sullivan, H.H. (Oak Ridge Gaseous Diffusion Plant, TN (USA)). 1982. Contract W-7405-ENG-26. 12p. (CONF-820611—4). NTIS, PC A02/MF A01. Order Number DE83007492.

From American Electroplaters Society (SUR/FIN) conference; San Francisco, CA, USA (20 Jun 1982).

Electroless nicke-plate characteristics are substantially influenced by percent phosphorous concentrations. Available ASTM analytical methods are designed for phosphorous concentrations of less than one percent compared to the 4.0 to 20.0% concentrations common in electroless nickel plate. A variety of analytical adaptations are applied through the industry resulting in poor data continuity. This paper presents a statistical comparison of five analytical methods and recommends accurate and precise procedures for use in percent phosphorous determinations in electroless nickel plate. 2 figures, 1 table.

21215 **(LA—9552) Anion exchange x-ray-fluorescence determination of uranium in plutonium.** Martell, C.J.; Hansel, J.M. (Los Alamos National Lab., NM (USA)). Feb 1983. Contract W-7405-ENG-36. 6p. NTIS, PC A02/MF A01. Order Number DE83008363.

An improved method is described for the determiation of uranium in plutonium metal and plutonium compounds using x-ray fluorescence following two anion-exchange separations. Uranium (as the chloride complex) is first separated from most of the 500-mg plutonium sample using anion-exchange resin in glass columns with 8M HCl and ascorbic acid. The eluate solution from this separation contains uranium as $(UO_2Cl_3)^-$, Pu^{+3}, and a small amount of Pu^{+4}. This solution is dried and redissolved in 8M HCl and ascorbic acid to reduce the Pu^{+4} to Pu^{+3}; it is then pipetted onto filter paper impregnated with anion-exchange resin. The plutonium is washed from the resin filter paper with 8M HCl, leaving uranium adsorbed on the paper. The L/sub α1/ x-ray line for the uranium is measured and compared to standards. The precision is 4% relative standard deviation for the concentration range from 5 to 200 μg uranium. The minimum detection limit is 1 μg uranium.

21216 **(LA-UR—83-409) Optical instrumentation for on-line analysis of chemical processes.** Hartford, A. Jr.; Cremers, D.A.; Loree, T.R.; Quigley, G.P. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 6p. (CONF-830420—2). NTIS, PC A02/MF A01. Order Number DE83007557.

From Society of Photo-Optical Instrumentation Engineers conference; Arlington, VA, USA (4 Apr 1983).

Optical diagnostics provide the capability for nonintrusive, on-line, real time analysis of chemical process streams. Several laser-based methods for monitoring fossil energy processes have been evaluated. Among the instrumentation techniques which appear quite promising are coherent anti-Stokes Raman spectroscopy (CARS), laser-induced breakdown spectroscopy (LIBS), and synchronous detection of laser-induced fluorescence (SDLIF). A CARS diagnostic was implemented on a coal gasifier and was successfully employed to measure species concentrations and temperatures within the process stream. The LIBS approach has been used to identify total trace impurities (e.g., Na, K, and S) within a gasifier. Recently, individual components in mixtures of aromatics hydrocarbons have been resolved via the synchronous detection of laser-induced fluorescence. 9 figures.

21217 **(MINTEK-M—50) Development of an on-line gold analyser.** Robert, R.V.D.; Ormrod, G.T.W. (Council for Mineral Technology, Randburg (South Africa)). 12 Oct 1982. 25p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83900725.

An on-line analyser to monitor the gold in solutions from the carbon-in-pulp process is described. The automatic system is based on the delivery of filtered samples of the solutions to a distribution valve for measurement by flameless atomic-absorption spectrophotometry. The sample is introduced by the aerosol-deposition method. Operation of the analyser on a pilot plant and on a full-scale carbon-in-pulp plant has shown that the system is economically feasible and capable of providing a continuous indication of the efficiency of the extraction process.

21218 **(NIM—2116) Optimum opertion of a direct-reading spectrometer with excitation by a 5-kW inductively coupled plasma torch.** Moore, G.L.; Watson, A.E.; Russell, G.M. (National Inst. for Metallurgy, Randburg (South Africa). Analytical Chemistry Div.). 14 Aug 1981. 38p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE82902437.

An examination was made of the optimum operating conditions, degree of interference from sodium ionization, and spectral interferences in a simultaneous 40-channel spectrometer having a data-reduction system controlled by a microprocesser. Excitation is provided by an inductively coupled plasma (ICP) source of medium power, i.e., with a nominal maximum of 5 kW. The optimum conditions were ascertained for atomic lines, for ionic lines, and for compromise multi-element analysis in aqueous solutions and in sodium solutions at concentrations up to 30 g/l, the detection limits for 37 elements being determined. It was found that an increase of approximately 30% in the power input under the optimum conditions for multi-element opertion reduced the interference from ionization caused by up to 30 g of sodium per litre to less than 5% relative. It was found that there is a correlation between the extent of the interference from ionization and the ionization potential of an element. Although the great majority of the lines in the spectral array were generally free of significant spectral overlap, several serious spectral interferences were observed and were determined quantitatively. 20 figures, 17 tables.

21219 **(PB—82-240011) Experimental studies of the geometric and electronic structure of chemisorption binding. Final report Feb 80-Jan 81.** Plummer, E.W.; Gustafsson, T. (Pennsylvania Univ., Philadelphia (USA). Dept. of Physics). May 1982. 59p. NTIS, PC A04/MF A01.

The basic understanding of surface phenomena is fundamental to many areas of importance to gas technology. This project has concentrated on the development and application of new instrumentational techniques to study adsorption phenomena on well characterized metal surfaces. Specifically angle-resolved, photon energy dependent, photoelectron spectroscopy has been utilized to study the geometric and electronic structure of adsorbed molecules. The oscillations in the cross section of the valence orbitals of adsorbed CO with photon energy have been utilized to determine the C-O spacing on the surface. The polarization dependence of the energy distributions from adsorbed hydrocarbons on Pt have revealed the bonding structure of the hydrocarbons as a function of substrate temperature.

21220 **Influence of increasing nuclear charge on the Rydberg spectra of Xe, Cs^+, and Ba^{++}: Correlation, term dependence, and autoionization.** Hill, W.T. III; Cheng, K.T.; Johnson, W.R.; Lucatorto, T.B.; McIlrath, T.J.; Sugar, J. (National Bureau of Standards and Institute for Physical Science and Technology, University of Maryland, College Park, Maryland 20742). *Physical Review Letters;* **49**: No. 22, 1631-1635(29 Nov 1982). Contract W-31-109-ENG-38.

The first experimental-theoretical study of Rydberg autoionizing resonances along an isoelectronic sequence is presented. This analysis demonstrates the intimate connection between electron-electron correlation, term-dependence, and autoionization and underscores the power of multichannel quantum defect theory in analyzing complex spectra.

21221 **Conformational dependence in the mass spectrum of cyclohexanecarboxaldehyde.** Splitter, J.S.; Calvin, M. (Univ. of California, Berkeley). *Journal of Organic Chemistry;* **47**: No. 23, 4545-4552(5 Nov 1982). Contract AC03-76SF00098.

The mass spectrum of cyclohexanecarboxaldehyde (1) was shown to fit a composite of the mass spectra of the equatorial and axial conformers. By comparison of the fragmentation processes from 1^+. with the processes from the fixed conformers corresponding to 1^+., the processes involving hydrogen abstraction by the oxygen atom as the initial step were attributed to the axial conformer, and the processes involving initial ring bond cleavage were attributed to the equatorial conformer. The abundant α-cleavage ion at 50 eV was attributed to both conformers, analogous to its occurrence in the fixed conformers. The loss of C_2H_4O from 1^+. was found to be loss of CH_3CHO and thus was attributed to equatorial 1^+.. Initial hydrogen abstraction in axial 1^+. was found to occur at a faster rate than initial ring bond stretching, whereas in equatorial 1^+. initial ring bond stretching was found to occur at a faster rate than conversion to axial 1^+..

21222 **Improved sensitive assay for polonium-210 by use of a background-rejecting extractive liquid-scintillation method.** Case, G.N.; McDowell, W.J. (Oak Ridge National Lab., TN (USA)). *Talanta;* **29**: No. 10, 845-848(Oct 1982).

A procedure is described for the determination of polonium-210 in various types of materials, including ores, mill tailings, and environmental samples, by a combined solvent-extraction liquid-scintillation spectrometry method. Concentration of polonium-210 and separation from interfering elements (such as iron) are accomplished by extraction from a 7 M phosphoric acid-0.01 M hydrochloric acid solution with 0.20 M trioctylphosphine oxide solution (together with a scintillator) in toluene. The polonium-210 is determined by counting the 5.3-MeV alpha-radiation with a photon/electron-rejecting alpha liquid scintillation spectrometer. Extraction coefficients of over 1000 for polonium ensure quantitative recovery, and no other alpha-emitters in the decay chains of uranium-238, uranium-235 and thorium-232 are extracted. The results for several samples show the relative standard deviation to be approximately 1.2%. A lower limit of detection of 0.0038 pCi is proposed, based on a counting time of 1000 min and an easily obtainable background of 0.01 cpm for the alpha peak.

21223 **Ultraviolet spectrometric determination of phenols as phenolate anions.** Disinger, J.; Manahan, S.E. (Univ. of Missouri, Columbia). *Analytical Letters;* **15**: No. 12A, 1017-1029(1982). Contract AS20-81LC10519.

This report describes a method which has been employed using phenolate ion absorption at 291 nm for the measurement of phenols in water. The monohydric phenols measured are among those abundant in coal gasification by-products. The errors obtained in employing an average proportionality constant for the calculation of concentrations of individual phenols are discussed. Using this method it is possible to calculate a reasonably accurate composite phenols concentration for a mixture of phenols.

21224 **The solvent extraction behavior of rhenium. Part II. The hydrochloric acid-tributyl phosphate system.** Pruett, D.J.; McTaggart, D.R. (Oak Ridge National Lab., TN). *Separation Science and Technology;* **17**: No. 8, 1091-1100(1982). Contract W-7405-ENG-26.

The solvent extraction of heptavalent rhenium from aqueous hydrochloric acid by tributyl phosphate (TBP) in n-dodecane (NDD) has been studied over a wide range of TBP and HCl concentrations at 25, 40, and 60°C. The extraction was found to proceed according to the reaction $3TBP + H^+ + ReO^-_4 = [HReO_4.3TBP]$. A discussion of the possible nature of the organic phase complex is presented, along with values of ΔG, ΔH, ΔS, and the equilibrium constant for the extraction reaction. The behavior of the $KReO_4$-H_2O-HCl-TBP system is compared and contrasted with that of the $KReO_4$-H_2O-HNO_3-TBP system and with the analogues $KTcO_4$ systems.

21225 **Beam-foil spectroscopy.** Berry, H.G.; Hass, M. (Physics Division, Argonne National Laboratory, Argonne, Illinois 60439). *Annual Review of Nuclear Science;* **32**: No. 1, 1-34(1982). Contract W-31-109-ENG-38.

A brief survey of some applications of beam-foil spectroscopy is presented. Among the topics covered are lifetime and magnetic moment measurements, nuclear alignment, and polarized light production. (AIP)

21226 **(DRIC-T—6367) Application of resonance Raman spectrometry in high performance liquid chromatography.** Saito, S.; Teramae, N.; Tanaka, N. Translated from *Nippon Kagaku Kaishi ;* 9: 1363-1366(1980). 13p. Defence Research Information Centre, Orpington, England.

A detection system for the sensitive and selective analysis of the eluted components of a high performance liquid chromatograph is described. The system connects a laser Raman spectrophotometer to a high performance LC. Results from investigations of dimethylaminoazobenzene compounds show that the LC Raman effect is highly sensitive and has a high degree of selectivity. It is possible to evaluate independently compounds which can not be separated by other methods. (ESA)

4002 Inorganic And Physical Chemistry

REFER ALSO TO CITATION(S) 19516, 19910, 20008, 21249, 21261, 21292, 21793, 22196

21227 **(ANL/NESC—487) STEAM-67; 1967 ASME steam and water properties.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Kaiser, A.H. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048487.

STEAM-67 is a set of routines for calculating the properties of steam and water according to the ASME Steam Tables, 1967, which have been modified in accordance with the ASME paper. Modifications were made to improve program running time as well as to correct some existing program errors. Corrections were also made to routines for the liquid region to improve accuracy on the IBM360 computer. CENTER is an auxiliary control program which selects the proper STEAM-67 routines.IBM360,370,303x; FORTRAN IV; OS/360; 140K bytes of memory are required to execute the sample problems.

21228 **(CONF-810294—1) Spontaneous reactions of xenon, fluorine, and antimony pentafluoride.** Stein, L. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 11p. NTIS, PC A02/MF A01. Order Number DE83007666.

From 5. winter fluorine conference; Daytona Beach, FL, USA (1 Feb 1981).

Mixtures of xenon and fluorine gases react spontaneously with liquid antimony pentafluoride in the dark to form solutions of $XeF^+ Sb_2F_{11}^-$. Dixenon cation, Xe_2^+, is formed as a labile intermediate product and is oxidized by the fluorine to XeF^+ cation. The rate of the overall reaction is proportional to the partial pressure of xenon and the partial pressure of fluorine. This direct combination of reagents provides a simple method for the preparation of $XeF^+ Sb_2F_{11}^-$. 5 figures, 1 table.

21229 **(CONF-821106—26) Mechanism and kinetics of NO/sub x/ gas absorption into alkaline solutions: considerations for selectivity toward hydroxylamine.** Kono, H.O.; Ninomiya, K. (Illinois Inst. of Tech., Chicago (USA); Ube Industries Ltd., Ube (Japan)). 1982. 29p. Institute of Gas Technology, 3424 South State Street - IIT Center, Chicago, IL 60616.

From Annual meeting of heat transfer and energy conversion; Los Angeles, CA, USA (14 Nov 1982).

The adsorption of NO and NO_2 gases into alkaline solutions such as ammonium sulfite is an industrially important reaction for the production of hydroxylamine. Because of the unstable characteristics of the NO_2^- ion formed in the gas-liquid interface film (liquid-side film), it is important to control the interface liquid film in order to attain a high selectivity of the reaction. 8 figures, 6 tables.

21230 **(DOE/ER/10485—T3) Surface studies of WO_3/Al_2O_3 and Ni/W/Al_2O_3 catalysts.** (Pittsburgh Univ., PA (USA)). 1980. Contract AC02-79ER10485. 26p. NTIS, PC A03/MF A01. Order Number DE83007299.

This study has provided a comprehensive picture of the nature of the tungsten species present in WO_3/Al_2O_3 and Ni/W/Al_2O_3 catalysts. It has been shown that WO_3/Al_2O_3 and MoO_3/Al_2O_3 catalysts are very similar structurally. Preliminary results for Ni/W/Al_2O_3 catalysts have shown that the promoting action of Ni is different than that of Co in Co/Mo/Al_2O_3 catalysts. Results led to the following conclusions: (1) At low loading (< 15% WO_3) the surface tungsten species is a tetrahedrally coordinated WO_4^{2-} interaction complex. (2) Between 15 to 24% WO_3 a polymeric WO_3 (octahedral) species is formed in addition to the tetrahedral interaction species. (3) Above 24% WO_3 crystallites of bulk WO_3 formed on top of the tungsten monolayer. (4) No detectable amounts of Al_2

$(WO_4)_3$ were presented in any of the catalysts studied. (5) The tungsten interaction species are not reducible while the bulk WO_3 deposited above 24% WO_3 is reduced to metallic W. (6) Nickel ions are incorporated into the tungsten monolayer displacing a portion of the tungsten interaction species. (7) The nickel species are completely reduced to metallic Ni. (8) The comparative x-ray Photoelectron Spectroscopy (ESCA) Laser Raman Spectroscopy (LRS) and Low Energy Ion Scattering Spectroscopy (ISS) studies demonstrate the complimentary nature of these techniques for the study of heterogeneous catalysts. 6 figures, 3 tables.

21231 (KFK—3392) Interfacial tension in systems involving TBP in dodecane, nitric acid, uranyl nitrate and water. Kolarik, Z.; Pipkin, N. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Heisse Chemie). Aug 1982. 17p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750182.

The interfacial tension was measured at 25°C in the systems TBP - n-dodecane/nitric acid - water and TBP - n-dodecane/nitric acid - uranyl nitrate - water. Empirical equations describing the interfacial tension as a function of the concentration of TBP in the starting organic phase and of uranium-(VI) and nitric acid in the equilibrium aqueous phase were suggested. In the absence of uranium (VI), the interfacial tension can also be correlated with the concentration of water in the equilibrium organic phase. Free TBP, hydrated or nonhydrated, and hydrated TBP solvates of nitric acid are interfacially active. Anhydrous TBP solvates of nitric acid and the TBP solvate of uranyl nitrate, which neither is hydrated, do not exhibit any visible interfacial activity.

21232 (ORNL/Sub—81-1012/2) General approach to the testing of binary solubility systems for thermodynamic consistency. Consolidated Fuel Reprocessing Program. Hamm, L.L.; Van Brunt, V. (South Carolina Univ., Columbia (USA). Coll. of Engineering). Aug 1982. Contract W-7405-ENG-26. 405p. NTIS, PC A18/MF A01. Order Number DE83007173.

A comparison of implicit Runge-Kutta and orthogonal collocation methods is made for the numerical solution to the ordinary differential equation which describes the high-pressure vapor-liquid equilibria of a binary system. The systems of interest are limited to binary solubility systems where one of the components is supercritical and exists as a noncondensable gas in the pure state. Of the two methods - implicit Runge-Kuta and orthogonal collocation - this paper attempts to present some preliminary but not necessarily conclusive results that the implicit Runge-Kutta method is superior for the solution to the ordinary differential equation utilized in the thermodynamic consistency testing of binary solubility systems. Due to the extreme nonlinearity of thermodynamic properties in the region near the critical locus, an extended cubic spline fitting technique is devised for correlating the P-x data. The least-squares criterion is employed in smoothing the experimental data. Even though the derivation is presented specifically for the correlation of P-x data, the technique could easily be applied to any thermodynamic data by changing the endpoint requirements. The volumetric behavior of the systems must be given or predicted in order to perform thermodynamic consistency tests. A general procedure is developed for predicting the volumetric behavior required and some indication as to the expected limit of accuracy is given.

21233 Dynamics of the reaction $D^+Z+C \rightarrow CD^+ + D$ at kinetic energies between 0.002 and 14 eV. Schuette, G.F.; Gentry, W.R. (Chemical Dynamics Laboratory, Department of Chemistry, University of Minnesota, Minneapolis, Minnesota 55455). *Journal of Chemical Physics;* 78: No. 4, 1777-1785(15 Feb 1983).

Absolute total reaction cross sections and product kinetic energy distributions have been measured for the reaction $D^+{}_2+C \rightarrow CD^+ + D$ over the range of initial kinetic energies between 0.002 and 14 eV. At very low collision energies, the reaction cross section is accurately proportional to the capture cross section calculated for Pi approaches of the reactants, taking into account the long-range charge-quadrupole and charge-induced dipole interactions. About 37% of close collisions on Pi surfaces lead to $CD^+ + D$ reaction products. Reactions on Σ surfaces are inhibited at low kinetic energies by a strongly repulsive charge-quadrupole interaction at large separations. The reaction is direct at all kinetic energies, with the CD^+ product scattered preferentially in the direction of the incident C atom. The reaction is extremely exoergic, and the CD^+ product is formed with an internal energy very near its dissociation limit over a large range of collision energies. Although the experimental results do not give direct information on the electronic state pathways to the observed products (except that the reactants approach asymptotically on Pi surfaces), the electronic state correlations suggest a low-energy adiabatic pathway to the CH^+ (^{3}Pi) first excited state of the products, which is consistent with both the measured values of the reaction cross sections and the reaction energetics.

21234 Studies on molybdena catalysts. XI. Oxygen chemisorption on sulfided catalysts. Zmierczak, W.; MuraliDhar, G.; Massoth, F.E. (Univ. of Utah, Salt Lake City). *Journal of Catalysis;* 77: No. 2, 432-438(Oct 1982).

Catalysts containing Mo or CoMo on various supports were prepared. Oxygen chemisorption on the sulfided catalysts was measured by a flow gravimetric technique. Activities of the catalysts were determined for thiophene hydrodesulfurization (HDS) and hexene hydrogenation in a catalytic microreactor at atmospheric pressure. Oxygen chemisorption increased with adsorption temperature. A definite adsorption was only obtained at -78°C, adsorption at higher temperatures continuing for over 4 hr. For O_2 chemisorption at -78°C: (i) CoMo versus Mo catalysts showed only marginally higher values; (ii) O_2 chemisorption did not correlate with HDS activity; and (iii) O_2 chemisorption showed a reasonable correlation with hydrogenation activity. It is probable that O_2 chemisorption reflects the general state of dispersion of the active Mo phase rather than specific HDS or hydrogenation sites.

21235 Oxygen on iron oxide: effect on the selective oxidation of butane. Yang, B.L.; Kung, H.H. (Northwestern Univ., Evanston, IL). *Journal of Catalysis;* 77: No. 2, 410-420(Oct 1982).

The effect of preadsorbed and gas phase oxygen on the selective oxidation of butene to butadiene on α-iron oxide was investigated using adsorption-desorption and pulse reaction technique. It was found that irreversibly adsorbed oxygen did not affect the butene oxidation reaction. However, the presence of gas phase oxygen significantly reduced the production of butadiene and increased the production of carbon dioxide. This decrease in butadiene production was due to the high reactivity of adsorbed butadiene precursors toward weakly adsorbed oxygen. However, these butadiene precursors were not reactive toward nitrous oxide. Therefore, under steady-state conditions, the rate of production of butadiene is determined by the competition between the desorption of butadiene and the degradation of the precursors by oxygen.

21236 Incorporation of collinear exact quantum reaction probabilities into three-dimensional transition-state theory. Bowman, J.M.; Ju, G.Z.; Lee, K.T. (Illinois Inst. of Tech., Chicago). *Journal of Physical Chemistry;* 86: No. 12, 2232-2239(10 Jun 1982). (CONF-8106160—). Contract AC02-81ER10900.

From American conference on theoretical chemistry; Boulder, CO, USA (21 Jun 1981).

This article shows how collinear exact quantum reaction probabilities can be naturally incorporated into transition-state theory for reactions with a collinear transition state. New expressions are derived for average cross sections which reduce to the previous transition-state theory ones when the collinear reaction probabilities are replaced by the appropriate transition-state theory approximants. Cross sections are calculated for the $H + H_2\ (\nu=0) \rightarrow H_2(\nu'=0) + H$ reaction and the $F + H_2(\nu=0) \rightarrow HF(\nu'=2)$, $HF(\nu'=3) + H$ reactions. Rate constants for the $H(D) + H_2(\nu=0)$, $H(D) + H_2(\nu=1)$ are also calculated and compared with experiment and previous calculations.

21237 **Applications of a simple dynamical model to the reaction path Hamiltonian: tunneling corrections to rate constants, product state distributions, line widths of local mode overtones, and mode specificity in unimolecular decomposition.** Cerjan, C.J.; Shi, S.; Miller, W.H. (Lawrence Berkeley Lab., CA). *Journal of Physical Chemistry;* **86**: No. 12, 2244-2251(10 Jun 1982). (CONF-8106160—). Contract W-7405-ENG-48.

From American conference on theoretical chemistry; Boulder, CO, USA (21 Jun 1981).

A simple but often reasonably accurate dynamical model--a synthesis of the semiclassical perturbation (SCP) approximation of Miller and Smith and the infinite order sudden (IOS) approximation--has been shown previously to take an exceptionally simple form when applied to the reaction path Hamiltonian derived by Miller, Handy, and Adams. This paper shows how this combined SCP-IOS reaction path model can be used to provide a simple but comprehensive description of a variety of phenomena in the dynamics of polyatomic molecules.

21238 **Semiclassical theory of intensities of vibrational fundamentals, overtones, and combination bands.** Koszykowski, M.L. (Sandia National Labs., Livermore, CA); Noid, D.W.; Marcus, R.A. *Journal of Physical Chemistry;* **86**: No. 12, 2113-2117(10 Jun 1982). (CONF-8106160—). Contract W-7405-ENG-26.

From American conference on theoretical chemistry; Boulder, CO, USA (21 Jun 1981).

Quantum mechanical and semiclassical results are compared for the spectrum of the Morse oscillator. When an average quantum number $[(n + m)/2]$ trajectory is employed for an $n \rightarrow m$ transition good agreement is obtained between the quantum and semiclassical intensities and between the frequencies, for the fundamental and overtones studied. Spectra of nonrotating OCS in the quasiperiodic and chaotic regions are presented, and the intensities of a number of overtones and combination bands are calculated. Even very low intensity transitions are observed.

21239 **Criteria for quantum chaos.** Heller, E.J. (Los Alamos National Lab., Albuquerque, NM); Davis, M.J. *Journal of Physical Chemistry;* **86**: No. 12, 2118-2124(10 Jun 1982). (CONF-8106160—).

From American conference on theoretical chemistry; Boulder, CO, USA (21 Jun 1981).

This paper reviews some of the opinions on quantum chaos put forth at the 1981 American Conference on Theoretical Chemistry and presents evidence to support the author's point of view. The degree of correspondence between classical and quantum onset and extent of chaos differs markedly according to the definition adopted for quantum chaos. At one extreme, a quantum generalization of the classical Kolmolgorov entropy which give zero entrophy for quantum systems with a discrete spectrum regardless of the classical properties, was a suitable foundation for the definition of quantum chaos. At the other, the quantum phase space definition shows generally excellent correspondence to the classical phase space measures. The authors preferred this approach. Another point of controversy is the question of whether the spectrum of energy levels (or its variation with some parameter of the Hamiltonian) is enough to characterize the quantum chaos (or lack of it), or whether more information is needed (i.e., eigenfunctions). The authors conclude that one does not want to rely upon eigenvalues alone to characterize the degree of chaos in the quantum dynamics.

21240 **Theory of polyatomic photodissociation. Adiabatic description of the dissociative state and the translation-vibration interaction.** Kresin, V.Z.; Lester, W.A. Jr. (Lawrence Berkeley Lab., CA). *Journal of Physical Chemistry;* **86**: No. 12, 2182-2187(10 Jun 1982). (CONF-8106160—). Contract W-7405-ENG-48.

From American conference on theoretical chemistry; Boulder, CO, USA (21 Jun 1981).

An adiabatic method for the evaluation of the nuclear wave function describing the final dissociative state and a rigorous description of the D state following adiabatic formulation are presented in this paper. The vibrational frequencies of the fragments are found to depend on the interfragment distance. The role of the translation-vibration interaction in polyatomic photodissociation is also discussed.

21241 **Collective excitations in π-electron systems.** Kresin, V.Z. (Lawrence Berkeley Lab., CA). *Journal of Physical Chemistry;* **86**: No. 12, 2187-2190(10 Jun 1982). (CONF-8106160—). Contract W-7405-ENG-48.

From American conference on theoretical chemistry; Boulder, CO, USA (21 Jun 1981).

A group of collective levels is found below the usual first-excited electronic energy level. The collective levels correspond to the poles of the two-particle Green function. The experimentally observed multiplet structure of the molecular spectra of large aromatic system is connected with these levels. Another group of levels is located considerably higher and corresponds to plasmon vibrations.

21242 **Incorporation of quantum effects in generalized-transition-state theory.** Truhlar, D.G.; Isaacson, A.D.; Skodje, R.T.; Garrett, B.C. (Univ. of Minnesota, Minneapolis). *Journal of Physical Chemistry;* **86**: No. 12, 2252-2261(10 Jun 1982). (CONF-8106160—). Contract AC02-79ER10425.

From American conference on theoretical chemistry; Boulder, CO, USA (21 Jun 1981).

This is a status report on practical aspects of the incorporation of quantum effects in generalized-transition-state theory. Attention is centered on methods for bound-mode quantization, including anharmonicity, and for estimating tunneling probabilities with account of the effects of reaction-path curvature. The emphasis is on methods that can be applied generally, and these methods are tested against accurate quantal results that are available for a few relatively simple cases. A selection of new calculations that illustrate important effects and some published results in the same context are presented in this report. The results presented here are for the reactions $H + H_2$, $D + D_2$, $Mu + H_2$, $Mu + D_2$, $Cl + T_2$, $Cl + HD$, $Cl + DH$, $I + H_2$, $Cl + HCl$, $OH + H_2$, $OH + HD$, $OH + DH$, and for the bound species H_2O and SO_2.

21243 **Comments on the linear free-energy correlation between O_3 and OH addition reactions reported in Rate Constants for the Gas-Phase Reactions of O_3 with a Series of Carbonyls at 296 K.** Gaffney, J.S.; Levine, S.Z. (Brookhaven National Lab., Upton, NY). *International Journal of Chemical Kinetics;* **14**: 1281-1283(1982).

Recently, Atkinson et al. reported measurements on the reaction of ozone with a series of carbonyls. In that study a correlation between ozone addition and hydroxyl-radical addition reactions was employed to predict OH addition coefficients for acrolein and crotonaldehyde of approximately 2×10^{-12} and 5×10^{-12} cm^3 $molecule^{-1}$ s^{-1}, respectively. These estimates, as pointed out by the authors, are in disagreement (factor of 2 to 3 lower) with the rate coefficients previously predicted by ourselves for the same OH addition reactions using linear correlations with both ionization potentials and $O(^3P)$ rate data. It was also suggested in that paper that this discrepancy was probably due to the likelihood that $O(^3P)$ atoms react significantly with carbonyls via an abstraction mechanism, that is, $O(^3P)$ rate data could not be appropriately correlated with OH addition reaction data. We believe that another, more probable, explanation exists for the above-mentioned discrepancy in rate constant estimates, and that this explanation involves the manner in which the correlation method is handled. Because this method of evaluating rate constants represents a potentially important predictive tool for chemical modelers, we feel it is necessary to reconcile the apparent disagreement in the OH-acrolein and OH-crotonaldehyde addition reaction coefficients estimated from O_3 correlations as compared to ionization potential and $O(^3P)$ correlations. In doing so, we will also demonstrate the necessity of employing linear correlations in a consistent manner.

21244 **Kinetics and product yield of the reaction of HO with HNO_3.** Nelson, H.H.; Marinelli, W.J.; Johnston, H.S. (Lawrence Berkeley Lab., CA). *Chemical Physics Letters;* **78**: No. 3, 495-499(15 Mar 1981). Contract W-7405-ENG-48.

Room temperature rate constants for the reaction $HO + HNO_3$ were obtained by laser flash photolysis; HO was observed by resonance fluorescence [k +- 2 σ = (8.2 +- 1.8) x 10^{-14} cm^3 s^{-1}]; and the product NO_3 was measured by laser absorption [(10.6 +- 3.4) x 10^{-14} cm^3 s^1]. The nitrate free radical NO_3 was a major product of the reaction. 4 figures.

21245 Ion mobilities and residence times under chemical ionization conditions. Polley, C.W. Jr.; Illies, A.J.; Meisels, G.G. (Univ. of Nebraska, Lincoln). *Analytical Chemistry;* **52**: No. 12, 1797-1803(Oct 1980). Contract AC02-76ER02567.

A pulsed chemical ionization (CI) source employing a coaxial electron entrance-ion exit geometry has been used to obtain ion mobility data for various CI reagent ions. Ion mobilities obtained by this method are in good agreement with results obtained by drift tube measurements where comparison is possible. Ion mobility measurements performed at 125 to 150°C provide information regarding the residence times of reagent ions under typical CI conditions. Residence times lie in the range 50 to 150 μs (E/P = 5V/(cm torr); T = 150°C; ion pathlength = 1.0 cm).

21246 The London approximation and the calculation of dispersion interactions as a sum of atom-atom terms. Yoffe, J.A.; Maggiora, G.M. (Univ. of Kansas, Lawrence). *Theoretica Chimica Acta;* **56**: 191-198(1980). Contract AC02-76ER02837.

A London approximation utilizing atomic valence state ionization potentials and static polarizabilities yields C_6 results in good agreement with accurate values for a number of systems. Generally there is considerable improvement over the results obtained using the London approximation in conjunction with molecular parameters and reasons for this are discussed.

21247 (KFK-tr—674) Reaction between alcohol and nitric acid in the presence of metal nitrates. Dansi, A. Translated from *Gazzetta Chimica Italiana ;* **62**: 953-958(1932). 11p. (In German). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83900869.

A study is made of reactions between alcohol and copper and nickel nitrates as well as between copper nitrate and isonitrosoacetate with reference to the production of mercury explosives.

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REFER ALSO TO CITATION(S) 19467, 19563, 19770, 19771, 21221, 21231, 21232, 21243, 21245, 21272, 21596

21248 (BMFT-FB-T—81-058) Crosslinking of polyethylene in view of an application in wire coating. Final report, December 1979. Franzkoch, B.; Beiss, K. (Technische Hochschule Aachen (Germany, F.R.)). Apr 1981. 261p. (In several languages). NTIS, PC A12/MF A01.

Bundesministerium fuer Forschung und Technologie REFS Sponsored by Bundesministerium fuer Forschung und Technologie.

Different polyethylene crosslinking methods to improve the characteristics of the material as wire coating were tested. It was determined that polyethylene curing by UV radiation is not suitable for application in wire coating. At higher insulation thickness, too much radiation is absorbed to cure deeper layers of the insulation. Using a shear gap die, melt temperatures can be raised within a very short time to a level high enough to initiate peroxide decay, thus starting the crosslinking reaction. Application of microwaves and use of special microwave-sensitive peroxides is recommended. These peroxides have to be polar to absorb energy from the alternating field. The energy splits the peroxy group of the molecule, thus generating radicals, and the crosslinking reaction takes place. (ESA)

21249 (CONF-8105105—7) Electronic structure of iron phthalocyanine and its analogs: a theoretical study. Sabelli, N.H.; Lee, L.K.; Melendres, C.A. (Illinois Univ., Chicago (USA). Dept. of Chemistry; Argonne National Lab., IL (USA)). Apr 1981. Contract W-31-109-ENG-38. 14p. NTIS, PC A02/MF A01. Order Number DE83007590.

From Symposium on electrocatalyis; Minneapolis, MN, USA (10 May 1981).

Molecular electronic structures of the dianions and iron complexes of phthalocyanine and other macrocyclic compounds (i.e., tetrabenzoporphyrin, tetrazaporphyrin and porphyrin) which are of interest in oxygen electrocatalysis have been calculated using CNDO/INDO molecular orbital methods. Significatn differences are found between the electron distributions in phthalocyanine and porphyrin due mainly to a difference in the nature of the atom bridging the indole and pyrrole ligands. Both iron complexes of phthalocyanine and porphyrin have a quintuplet molecular electronic ground state with iron in an intermediate spin state in the former and high spin in the latter. Binding of oxygen to the iron center in model compounds of iron phthalocyanine and iron porphyrin was studied. Side-on configuration appears to be preferred in the oxygen-phthalocyanine system and end-on bonding in the oxygen-porphyrin complex. The effect of catalyst support, electron delocalization by dimerization, and protons in solution on the oxygen binding by iron phthalocyanine was also examined and preliminary results are described. 2 figures, 3 tables.

21250 (DOE/PC/30075—12) Cross-reaction networks in the catalytic hydrodenitrogenation of synthetic liquid fuels. Quarterly report, November 1, 1982-January 31, 1983. Satterfield, C.N.; Smith, C.M.; Ingalls, M. (Massachusetts Inst. of Tech., Cambridge (USA)). 1983. Contract AC22-80PC30075. 11p. NTIS, PC A02/MF A01. Order Number DE83006377.

Experimental studies in the trickle bed reactor have continued with a fresh sample of our standard NiMo/Al_2O_3 catalyst. This was allowed to reach steady-state activity which required about 150 hours after which the enhancing effect of water on the HDN of quinoline was observed by the addition of an alcohol. We are currently studying the reversibility of this water effect and the interaction of H_2S with H_2O. Some of our earlier work suggested that NH_3 has a strong inhibiting effect on hydrogenation reactions and we have now re-examined this effect in a collaborative effort with Prof. S. Gueltekin of the University of Petroleum and Minerals, Dhahran, Saudi Arabia. Studies at 330 to 375°C and 3.55 and 6.9 MPa total pressure on a commercial NiMo/Al_2O_3 catalyst showed that addition of H_2S to propylbenzene (PBz) (each at 13.3 kPa) depressed its hydrogenation rate by a factor of two. NH_3 alone at 13.3 kPa, or with H_2S, depressed the hydrogenation rate by a factor of 8 or more. In all cases the hydrogenation rate was first order with respect to propylbenzene. The significance of these results is that it suggests that addition of NH_3 during hydrodenitrogenation (e.g. by recycling) may reduce hydrogen consumption. We intend to pursue this possibility further by experimental studies in our trickle-bed reactor.

21251 (LA-UR—83-260) Untangling the water gas shift from Fischer-Tropsch: a Gordian knot. Rofer-Depoorter, C.K. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 68p. (CONF-830410—1). NTIS, PC A04/MF A01. Order Number DE83006066.

From 17. Middle Atlantic Regional meeting of the American Chemical Society; White Haven, PA, USA (6 Apr 1983).

The water gas shift reaction is an integral part of the Fischer-Tropsch synthesis. Although it may appear convenient to consider the water gas shift a separate reaction, in some cases, a detailed examination of the mechanism indicates theat the water gas shift and other synthesis gas reactions share several elementary reactions. Experimental support for the relevant elementary reactions for the water gas shift on metals, metal oxides, and in homogeneous solution is examined, from both surface and complex chemistry. Multiple paths leading to a net water gas shift reaction may be available; oxygen transfer and reaction through C-H-O intermediates may take place. 185 references, 6 tables.

21252 Dynamics of the reaction $D^+Z+F(^2P) \rightarrow FD^+ + D$ at kinetic energies between 0.002 and 30 eV. Schuette, G.F.; Gentry, W.R. (Chemical Dynamics Laboratory, Department of Chemistry, University of Minnesota, Minneapolis, Minnesota 55455). *Journal of Chemical Physics;* **78**: No. 4, 1786-1794(15 Feb 1983).

The merged molecular beam technique has been used to study the reaction $D^+{}_2+F(^2P) \rightarrow FD^+ + D$ over the kinetic energy range from 0.002 to 30 eV. The energy dependence of the absolute total reaction cross section at low kinetic energies indicates that reaction occurs with unit probability for capture collisions on potential energy surfaces which correlate with Pi intermediates. This result is consistent with the adiabatic state correlations, which connect the reactants to the ground state products $FD^+(^2Pi)+D(^2S)$ via both the ^1Pi and ^2Pi surfaces in collinear approches. At higher energies, an inflection in the reaction cross section is thought to be caused by onset of the endoergic reaction to give excited state products $FD^+(^2\Sigma)+D(^2S)$. The reaction mechanism is direct over the entire range of collision energies, with the FD^+ product scattered preferentially in the direction of the incident F-atom reactant in the center-of-mass system, except for extremely high collision energies (E/sub i/ = 25 eV), where a roughly symmetric distribution is seen. Very little theoretical work has been carried out on the dynamics of reactions between two open-shell species. The relative simplicity of the $D^+{}_2+F(^2P)$ system makes it an attractive candidate for such studies.

21253 Photonitration of phenols by tetranitromethane under visible light. Seltzer, S. (Brookhaven National Lab., Upton, NY); Lam, E.; Packer, L. *Journal of the American Chemical Society;* **104**: No. 23, 6470-6471(17 Nov 1982).

Recent laboratory studies with bacteriorhodopsin (bR) have uncovered a different type of TNM-nitration reaction of phenols. Nitration of a tyrosine residue of bR by TNM has been found to be light dependent ($\lambda \geqq 530$ nm) at pH 5.5. This observation prompted a study of model systems. This report discusses the possible synthetic utility that bR may have in the nitration of labile systems and the mechanistic information that they provide.

21254 Synthesis of benzyl and benzyloxycarbonyl base-blocked 2′-deoxyribonucleosides. Watkins, B.E.; Rapoport, H. (Univ. of California, Berkeley). *Journal of Organic Chemistry;* **47**: No. 23, 4471-4477(5 Nov 1982). Contract AC03-76SF00098.

Acylimidazoles have been alkylated with trialkyloxonium tetrafluoroborates to form acylimidazolium salts. These salts, particularly (benzyloxycarbonly)imidazolium salts, are shown to be effective agents for the direct, mono-N-protection of deoxynucleosides as their acyl derivatives. These acyl nucleosides are also available via thiocarbamate intermediates. Thus 3′,5′-bis(tert-butyldimethylsilyl)-2′-deoxyguanosine, on treatment with phenyl chlorothioformate, gave the 6-thiophenyl-substituted purine (1). The thiophenyl group of (1) can be replaced by hydrogen, amino, and alkoxy groups to give a variety of substituted purine deoxyribonucleosides.

21255 Reductive cleavage mechanism of diphenyl ether and apparent ipso trapping of an intermediate radical anion with a silyl ether. Patel, K.M.; Baltisberger, R.J.; Stenberg, V.I.; Woolsey, N.F. (Univ. of North Dakota, Grand Forks). *Journal of Organic Chemistry;* **47**: No. 22, 4250-4254(22 Oct 1982). Contract FG22-78ET13380;AC01-76ET10516.

Chemical evidence for a radical anion mechanism in the case of reductive cleavage of diphenyl ether under Na/HMPA conditions is reported. The product phenyl radical abstracts a hydrogen atom instead of successive capture of an electron. Other ether (dibenzyl, benzyl phenyl, and methyl phenyl) are also cleaved under these reductive conditions. The initally formed radical anion of diphenyl ether is apparently largely trapped before cleavage by trimethylsilyl ethers leading ultimately to ipso phenyl substitution. The mechanism of ipso substitution is discussed.

21256 Formic acid and the high-temperature reductive desulfurization of aromatic sulfides. Van Buren, R.L.; Baltisberger, R.J.; Woolsey, N.F.; Stenberg, V.I. (Univ. of North Dakota, Grand Forks). *Journal of Organic Chemistry;* **47**: No. 21, 4107-4110(8 Oct 1982).

When diphenyl sulfide is heated with formic acid to 450°C, it is converted to benzene, toluene, thiophenol, thioanisole, and benzoic acid. By increasing the time of reaction, diphenyl sulfide is converted completely to benzene and toluene. The mechanism of toluene and benzoic acid formation is studied by kinetic data and by comparing CO and CO_2 as possible sources for the extra carbon. It is concluded that PhS. and CO are the precursors to benzoic acid, toluene, thiophenol, and thioanisole. Formic acid reacts primarily via the metal surface of the reactor and most probably with radical initiation.

21257 The reactivity and composition of strongly adsorbed carbonaceous deposits on platinum. Model of the working hydrocarbon conversion catalyst. Davis, S.M.; Zaera, F.; Somorjai, G.A. (Univ. of California, Berkeley). *Journal of Catalysis;* **77**: No. 2, 439-459(Oct 1982). Contract W-7405-ENG-48.

The role of strongly adsorbed hydrocarbon deposits in reforming catalysis on a series of flat, stepped, and kinked platinum single-crystal surfaces at atmospheric pressures and temperatures between 300 and 700 K has been established and a model developed for the working structure and composition of the active catalyst surface. Restart reaction studies and reaction rate studies using platinum surfaces precovered with carbonaceous overlayers containing carbon-14 were used to investigate the catalytic activity and selectivity of carbon-covered platinum in hydrocarbon hydrogenation, dehydrogenation, and skeletal rearrangement. Quantitative hydrogen thermal desorption studies were carried out as a function of surface structure and reaction temperature to determine (1) the composition, and (2) the energetics for sequential dehydrogenation of carbonaceous deposits derived from a variety of adsorbed hydrocarbons including isobutane, neopentane, n-hexane, and cyclohexene. Carbon monoxide adsorption thermal desorption methods were developed to titrate uncovered platinum surface sites before and after reaction rate studies. The uncovered-site concentrations were correlated with the total surface carbon coverage as determined by Auger electron spectroscopy and the catalytic activity and selectivity of carbon-covered platinum. These experiments together with results from related structure sensitivity, thermal desorption, deuterium exchange, and radiotracer studies revealed that the primary role of the disordered carbon deposit is that of a nonselective poison which blocks platinum surface sites from incident reactant molecules.

21258 Extractable organic matter in municipal wastewaters. 2. Hydrocarbons: molecular characterization. Eganhouse, R.P.; Kaplan, I.R. (Univ. of California, Los Angeles). *Environmental Science and Technology;* **16**: No. 9, 541-551(Sep 1982).

Hydrocarbons isolated from southern California municipal wastewaters were analyzed by high-resolution gas chromatography and computer-assisted gas chromatography-mass spectrometry. Most of the hydrocarbons (56-77%) are not chromatographically resolvable and probably derive from petroleum products such as lubricating oils. Normal, iso-, and acyclic isoprenoid alkanes along with alkylcyclohexanes and numerous series of substituted benzenes and polycyclic aromatic hydrocarbons compose the major fraction of the resolvable hydrocarbons. Polycyclic terpenoids occur as trace constituents and appear also to be of ancient, not recent biosynthetic, origin. However, the virtual absence of 17α(H),18α(H),21β(H)-28,30-dinorhopane, a specific marker of California oils, indicates that locally produced petroleum is, at most, a minor contributor to these wastewaters. A homologous series of long-chain alkylbenzenes presumably derived from the LAS-type detergents was identified. These compounds seem to be abundant and ubiquitous domestic wastewater constituents that might be exploited as anthropogenic waste tracers in the marine environment.

21259 Simultaneous measurement of CO oxidation rate and surface coverage on Pt/Al_2O_3 using infrared spectroscopy: rate hysteresis and CO island formation. Haaland, D.M. (Sandia National Labs., Albuquerque, NM); Williams, F.L. *Journal of Catalysis;* **76**: No. 2, 450-465(Aug 1982). Contract AC04-76DP00789.

The catalytic oxidation of CO on a commercial Pt/Al_2O_3 catalyst has been studied at a total pressure of one atmosphere using Fourier transform infrared spectroscopy. Simultaneous measurements of steady-state reaction rates and CO surface coverages were obtained at temperatures between 460 and 520 K. During oxidation, the frequency of the infrared absorption peak of linear-bonded CO is invariant at 2081 cm^{-1} at 520 K over nearly a 100-fold change in CO surface coverage. This peak position is within 1 cm^{-1} of that found for saturation coverage in the presence of pure CO at one atmosphere. In contrast, under nonreactive desorption, large shifts in frequency are found as the CO surface coverage changes. The ratio of the intensities of the absorption bands due to both linear and bridge-bonded CO was constant during oxidation. These observations are interpreted as resulting from the formation of islands of CO during the oxidation reaction. Hysteresis in both CO reaction probability and CO surface coverage are found which are inversely related. Thus CO blocks active sites on the Pt for the reaction. The width and shape of the hysteresis loops as a function of temperature are qualitatively understood in terms of the rate of CO desorption from the Pt surface. At very high surface coverages, changes in the reaction probability are not accompanied by changes in adsorbed CO. This may be due either to the formation of surface species, unobserved in ir, which block the reaction or to the presence of a small number of very reactive Pt sites which are blocked with only a very small change in CO surface coverage.

21260 **Generation and characterization of ethylene glycol vapors and aerosols.** Cheng, Y.S.; Marshall, T.C.; Kanapilly, G.M. (Lovelace Biomedical and Environmental Research Inst., Albuquerque, NM). *American Industrial Hygiene Association Journal;* No. 43, 250-253(Apr 1982). Contract AC04-76EV01013.

Methods for generating ethylene glycol vapors and aerosols for short-term animal inhalation exposures are described. Experimental conditions were established for stable vapor output by vaporizing ethylene glycol in a furnace. The vapor concentration, which was measured by three independent methods, increased with vaporization temperature (70 to 110°C) but leveled off at temperatures exceeding 110°C. The maximum concentration was around 310 μg of ethylene glycol per liter of air. This is close to the saturated ethylene glycol vapor concentration at room temperature and 620 Toor ambient pressure. No thermal decomposition products were detected. A vaporization-condensation method was used to form ethylene glycol droplets condensed on $^{67}Ga_2O_3$ nuclei which served as a gamma tracer for the droplets. Mass median aerodynamic diameters as determined by a Mercer impactor were about 1.2 μm.

21261 **Fluorogermanium(IV) salts of graphite. A system in equilibrium with elemental fluorine.** McCarron, E.M.; Grannec, Y.J.; Bartlett, N. (Lawrence Berkeley Lab., CA). *Journal of the Chemical Society, Chemical Communications;* **158**: 890-891(1980).

Pyrolytic graphite is not intercalated by GeF_4 alone but is intercalated by GeF_4-F_2 mixtures to yield, at the intercalation limit, at 20°C, a first-stage material, $C_{12}GeF$/sub 5-6/, which is in equilibrium with gaseous fluorine.

4004 Electrochemistry

REFER ALSO TO CITATION(S) 19927

4005 Photochemistry

REFER ALSO TO CITATION(S) 19928, 21244, 21248, 21253, 21285

21262 **(AD-A—115149/7) Photoionization of molecular clusters. Final report 1 May 78-30 Sep 81.** Andres, R.P.; Calo, J.M. (Princeton Univ., NJ (USA). Dept. of Chemical Engineering). Dec 1981. 53p. NTIS, PC A04/MF A01.

An experimental apparatus consisting of a novel multiple expansion cluster source coupled with a molecular beam system and photoionization mass spectrometer has been designed and constructed. This apparatus has been thoroughly tested and preliminary measurements of the growth kinetics of water clusters and the photoionization cross section of the water dimer have been carried out.

21263 **(CONF-8103158—1) Primary events of photosynthesis.** Shipman, L.L. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 10p. NTIS, PC A02/MF A01. Order Number DE83007780.

From Workshop on molecular electronic devices; Washington, DC, USA (23 Mar 1981).

The primary events of photosynthesis are those photophysical and photochemical events that occur immediately after absorption of a photon by the photosynthetic pigments. The primary events include the migration of singlet excitons among the antenna pigments, exciton trapping by the reaction center, and a sequence of several electron transfer steps that leads to the formation of a stable electron-hole separation. All of the primary events occur within protein complexes which include chlorophylls, carotenoids, quinones, and various other transfer components. These complexes are called photosystems. Photosystems reside in a special photosynthetic membrane in organisms such as algae, higher plants, purple photosynthetic bacteria, and green photosynthetic bacteria. In this manuscript the primary events of photosynthesis are summarized with particular attention to the principles that they might hold for the design of molecular electronic devices.

21264 **(CONF-8103158—2) Two-electron gates in photosynthesis.** Shipman, L.L. (Argonne National Lab., IL (USA)). 1981. 6p. NTIS, PC A02/MF A01. Order Number DE83007779.

From Workshop on molecular electronic devices; Washington, DC, USA (23 Mar 1981).

Principals underlying the design of naturally occurring electron gates in the photosynthetic apparatus of green plants and photosynthetic bacteria are discussed and related to molecular electronics. A pair of quinones participates in election transfer on the reducing side of photosystem II of green plants and the photosystem found in purple photosynthetic bacteria. The quinones are photochemically reduced by electron transfers from the primary events of photosynthesis. In each quinone, there are 2 binding sites, Q1 and Q2. The quinones Q1 and Q2 are non-covalently bound to intrinsic membrane protein. Also, in both systems there is a pool of quinones of the same chemical structure which are outside the photosystem, but reside in the same membrane. Protons move from aqueous solution outside the photosynthetic membrane onto the quinone-protein complex as electrons are pumped to the quinones. The rate of proton uptake is almost two-orders of magnitude slower than electron transfer rate. Electron transfer from Q1 to Q2 is temperature dependent. Problems arising in biomimetic molecular systems are discussed. (DMC)

21265 **(DOE/ER/03569—T2) Gas-phase radiolysis and vacuum-ultraviolet photolysis of heterocyclic organic compounds.** Scala, A.A. (Worcester Polytechnic Inst., MA (USA). Dept. of Chemistry). 1982. Contract AC02-76ER03569. 20p. NTIS, PC A02/MF A01. Order Number DE83007850.

The long-range objective of our research group is to gain a better understanding of the processes by which complex organic molecules react when they absorb large amounts of energy. This progress report describes the results of our recent work in three areas: A. Vacuum-Ultraviolet Photolyses; B. Ion-Molecule Reactions in Gaseous vs. Solution Phase; C. Structure-Reactivity Correlations in Ion-Molecule Reactions of Organic Heterocycles. 6 tables.

21266 **(DOE/ER/04380—6) Formation of fuel via photochemical electron transfer. Progress report, February 1, 1982-January 31, 1983.** Jones, G. II. (Boston Univ., MA (USA). Dept. of Chemistry). 25 Jan 1983. Contract AC02-77ER04380. 21p. NTIS, PC A02/MF A01. Order Number DE83007147.

Current research is devoted to photo-induced electron transfer reactions which have particular relevance to the generation of fuels or useful chemicals, potentially using sunlight as a radiation source. Results from the following studies are given: a comparison of electron transfer yield as a function of charge type in ruthenium (II) complexes and methyl viologen analogs; ionic photodissociation of visible absorbing CT complexes of methyl viologen (MV^{2+}); dioethers as electron transfer agents; simulated temperature dependence of quantum yields for photoreactions involving energy or electron transfer; and effects of ultra-high magnetic fields on intramicellar radical pair dynamics in amphiphilic media.

21267 **(EUR—7678-EN) Kinetic factors controlling the yield of photosystem II and O_2 emission.** Lavorel, J.; Maison, B. (Commission of the European Communities, Luxembourg). 1982. 47p. Available from the Commission of the European Communities, Luxembourg.

In the present paper, three topics have been studied: The first and the second (misses and deactivation) are dealing with kinetic properties of the so called OES (i.e. oxygen evolving system) of photosynthesis which may limit its efficiency for photoconversion applications. The third (dark luminescence) is a new phenomenon which may contribute to a better understanding of OES.

21268 **(EUR—7679-EN) Study of primary reactions of photosynthesis in green plants by rapid flash absorption spectroscopy.** Mathis, P.; Conjeaud, H.; Reinman, S.; van Best, J. (Commission of the European Communities, Luxembourg). 1982. 48p. Available from the Commission of the European Communities, Luxembourg.

We have applied the method of flash absorption spectroscopy to improve our understanding of the primary processes of photosynthesis in green plants. Part of our effort has been devoted to the realization of new ensembles of photodetectors (silicium photodiodes) and amplifiers which represent an important improvement over our past equipment. The photochemistry of the Photosystem-1 reaction center leads to the reduction of strong reductants, which are arranged as a chain of carriers. The sequence of electron acceptors has been studied. At physiological temperatures we have shown that two acceptors (A_1, A_2) are more primary that the species P-430. We showed that P-430 has a 2-e-capacity. The kinetics of reaction have also been studied at low temperature. A_2 is probably the species named X, known from low-temperature EPR experiments. A_1 is still chemically unknown. The Photosystem-2 reaction center is directly responsible for the photosynthetic oxygen evolution. We studied a few properties of P-680 (photoactive chlorophyll a complex) and its immediate donor D1 which is connected to the oxygen evolving complex. The kinetic behaviour of P-680$^+$ has been conveniently studied by following absorption changes at 820 nm. In physiological conditions, D_1 reduces P-680$^+$ in less than a microsecond (30 ns after dard-adaptation). Inhibition of O_2-evolution leads to a much slower, pH-dependent, reduction of P-680$^+$ either by D_1 (2-40 μs) or by electron return from the primary plastoquinone PQ_1 (150 μs). D_1 has a one-electron capacity. Measurements of the electrochromism of carotenoids led us to conclude that P-680 and D_1 are located at the internal side of the thylakoid membrane.

21269 **(EUR—7682-EN) Photochemical dissociation of water by means of visible light.** Harriman, A.; Porter, G. (Commission of the European Communities, Luxembourg). 1982. 142p. Available from Commission of the European Communities, Luxembourg.

Photosynthesis provides the only practical solution for the collection and storage of solar energy. This is achieved by coupling together two photoreactions; one reaction reduces CO_2 to the level of carbohydrate whilst the second reaction leads to the oxidation of water to molecular oxygen. This second step is of great current interest since, by itself, it is capable of storing solar energy in the form of a chemical fuel. Although the detailed mechanism of this second reaction is far from clear, it is believed that a manganese complex acts as the active catalyst for oxidation of water whilst chlorophyll acts as the photosensitiser.

21270 **(EUR—7687-EN) Photochemical dissociation of water adsorbed in artificial membranes made from phyllosilicates.** Fripiat, J.J.; Abdo, S. (Commission of the European Communities, Luxembourg). 1982. 66p. Available from the Commission of the European Communities, Luxembourg.

The objective of this work is to construct a purely artificial solid-state system able to dissociate water photochemically with solar light, at the gas-solid interface. The mechanism by which this is hoped to be achieved is directly related to the natural or semiartificial photosynthetic systems and can be described in four basic steps: - capture of solar photons by a pigment and generation of an excited state - conversion of this electronic energy into transient electrochemical energy by electron transfer from the excited pigment to an acceptor - conversion of this transient electrochemical energy into stored chemical energy through the production of hydrogen and oxygen.

21271 **(LBL—15480) Molecular-beam studies of primary photochemical processes.** Lee, Y.T. (Lawrence Berkeley Lab., CA (USA)). Dec 1982. Contract AC03-76SF00098. 16p. (CONF-830128—1). NTIS, PC A02/MF A01. Order Number DE83006190.

From International conference on photochemistry and photobiology; Alexandria, Egypt (5 Jan 1983).

Application of the method of molecular-beam photofragmentation translational spectroscopy to the investigation of primary photochemical processes of polyatomic molecules is described. Examples will be given to illustrate how information concerning the energetics, dynamics, and mechanism of dissociation processes can be obtained from the precise measurements of angular and velocity distributions of products in an experiment in which a well-defined beam of molecules is crossed with a laser.

21272 **(NP—3901014) Direct investigation of hydrogen chloride elimination from 1,2-dichlorothane by laser induced radical chain reactions.** Schneider, M. (Max-Planck-Institut fuer Stroemungsforschung, Goettingen (Germany, F.R.)). Dec 1981. 66p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83901014.

The elimination of hydrogen chloride from 1,2 dichlorethane which proceeds as a chain reaction, has been studied in a flow reactor at temperatures between 520-720 K and pressures from 60 to 600 torr. The chain reaction has been initiated by KrF$^-$ laser photolysis of dichlorethane. Measurements of the UV-absorption spectra temperature dependence are presented for dichlorethane and the products vinylchloride and hydrogen chloride in the temperature range 300-770 K. At these temperatures an absorption enhancement of dichlorethane of three orders of magnitude is observed for a photolysis wavelength of 248 nm (KrFsup(*)). The quantum yield oe of the chain reaction has been determined in the flow reactor and in a static cell. For a constant rate the quantum yield follows an Arrhenius law in the temperature range 520-720 K, with an activation energy of 53 kJ/mol. By variation of the laser energy a decrease in quantum yield is observed proportional with the square root of the initial radical concentration. The kinetics of the system has been simulated and a good agreement between the calculated and measured concentration-time-profiles is obtained. Based on this simulation predictions can be made for the reaction behaviour and the quantum yield in temperature and pressure regions outside the experimental conditions.

21273 **(SAND—82-3002C) Surface chemical information from electron- and photon-stimulated desorption.** Knotek, M.L. (Sandia National Labs., Albuquerque, NM (USA)). 1982. Contract AC04-76DP00789. 45p. (CONF-8209101—1). NTIS, PC A03/MF A01. Order Number DE83007367.

From Inelastic ion, surface collision conference; Middlefart, Denmark (21 Sep 1982).

Electron- and Photon-Stimulated Desorption can provide atomic and structural information on the chemical state of surfaces and adsorbates on surfaces. Information is contained in the variation of desorption yield with chemical state, ion energy distributions, ion angular distributions, and in desorption thresholds and spectral dependence. Current models for desorption discuss both ionic and covalent systems and provide considerable insight into the environment of desorbing species. Widely studied examples include oxygen on metals, CO on metals, hydrogen on metals and semiconductors, and cryogenic molecular solids as models for desorption. All of theses systems show variations in ion yield with chemical state of the desorbing species which in many cases fit existing models but in some cases suggest new mechanisms of desorption. Ion energy and angular distribution provide signatures of the type of state yielding desorption and the local structure of the desorption site. Desorption spectra can provide electronic and structural details of the bonding site from the analysis of near edge and extended fine structure. Near edge structure can also be used as a signature by comparison to systems of known chemical environment. The above examples of the combined use of the different variations of the desorption experiment are discussed. 115 references, 7 figures.

21274 **Investigation of the properties of the primary electron acceptor complex of photosystem I.** Evans, M.C.W.; Heathcote, P.; Nugent, J. Luxembourg; Commission of the European Communities (1982). 61p. (EUR—7683-EN). .

There are two groups of photosynthetic organisms, the photosynthetic bacteria with a single photochemical system which functions with a redox range of +500 to -600 mV and the oxygen evolving organism with two photosystems with an overall redox range of +1000 mV to about -900 mV. The bacterial system is the best understood but it seems likely that eventually the plant system will be of most interest because it has the ability to use water as electron donor and produce a reductant able to reduce protons to hydrogen. This process however is very complicated and involves two photochemical systems. One of these (Photosystem 2) produces the oxidant which oxidises water and a reductant at about 0 mV. The other (Photosystem I) oxidises this reductant at about 0 mV. The other (Photosystem I) oxidises this reductant and produces a low potential reductant, which is used by the plant to fix CO_2, but which could possibly be used for hydrogen production. The work described in this report has been mainly concerned with the mechanism of photosystem I and in particular with composition of the electron acceptor system.

21275 **Photolysis of 1-iodopropane.** Carr, R.W. Jr.; Topor, M.G. (Univ. of Minnesota, Minneapolis). *Journal of Photochemistry;* **16**: 51-65(1981). Contract AC02-76ER02026.

Photodissociation of 1-iodopropane vapor was studied at 265, 236.5, 222.4 and 214 nm. In all cases highly vibrationally excited n-propyl radicals were formed. Excited n-propyl radical dissociation to methyl radicals and ethylene was observed at all wavelengths shorter than 265 nm; evidence was obtained for a dissociation pathway of lesser significance to hydrogen atoms and propylene. Model calculations indicated that the photodissociation occurs by an impulsive mechanism and that a population inversion of I(^{2}/sub 1/2/) and I(^{2}P/sub 3/2/) occurs at all wavelengths. Furthermore, the calculations suggest that the inversion is smaller at 214 nm than at wavelengths which are in the 1-iodopropane A band. 6 figures, 2 tables.

4006 Radiation Chemistry

REFER ALSO TO CITATION(S) 21273, 21513

21276 **(BMFT-FB-T—81-122-VOL-1) Crosslinking of polyolefin insulation of cables and insulated wires by the use of energy-rich radiation. Part 1: material of irradiation. Final report, March 1980.** Pieper, D.; Schillmoeller, A. (Siemens A.G., Neustadt b. Coburg (Germany, F.R.)). Jul 1981. 173p. (In several languages). NTIS, PC A08/MF A01.

Bundesminesterium fuer Forschung und Technologie REFS Sponsored by Bundesministerium fuer Forschung und Technologie.

Polyolefins were selected that are crosslinkable by radiation including the copolymers of ethylene and polyolefin elastomer blends. Effective stabilizing systems against thermo-oxidative ageing and copper-catalized oxidation were developed. The influence of crosslink-reforcing, coagents fillers, and pigments was studied. For the materials XLPE, EPR and EVA the optimization of compounds in a scope of production trials resulted in useful proposals for solutions for 1kV insulating compounds.

21277 **(BMFT-FB-T—81-124-VOL-3) Crosslinking of polyolefin insulations of cables and insulated wires by the use of energy-rich radiation. Part 3: production engineering. Final report, March 1980.** Bickel, H.D.; Heublein, H.; Weber, D. (Siemens A.G., Neustadt b. Coburg (Germany, F.R.)). Jul 1981. 224p. (In several languages). NTIS, PC A10/MF A01.

Bundesministerium fuer Forschung und Technologie REFS Sponsored by Bundesministerium fuer Forschung und Technologie.

Crosslinking of the PE insulations of electrical conductors by means of electron beams represents a perfect alternative to existing thermic and chemical procedures. From projecting-up to running-in of the plant there were no difficulties of general nature. For an essential range of products the most important production parameters could be determined. Some problems occuring during the radiation of products, such as straightening of the conductor, nonperformance of the exactly specified adhesion power of the insulation to the conductor and non-uniform thickness of insulation could be eliminated by an optimization of the concerned parts of the plant. With the exception of three greater repairs within 4 years, up to now no defects were to be observed in the radiation plant. Heavy corrosion in the radiation part by ozone and nitrogen oxides in the beginning was reduced to an acceptable degree by suitable measures.

21278 **(CONF-8109205—1) Structure and dynamics of paramagnetic transients by pulsed EPR and NMR detection of nuclear resonance.** Trifunac, A.D. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 16p. NTIS, PC A02/MF A01. Order Number DE83007707.

From NATO Advanced Study Institute conference on fast processes and labile species in chemistry and molecular biology using ionizing radiation; Capri, Italy (7 Sep 1981).

Structure and dynamics of transient radicals in pulse radiolysis can be studied by time resolved EPR and NMR techniques. EPR study of kinetics and relaxation is illustrated. The NMR detection of nuclear resonance in transient radicals is a new method which allows the study of hyperfine coupling, population dynamics, radical kinetics, and reaction mechanism. 9 figures.

21279 **(CONF-8109205—3) EPR and NMR detection of transient radicals and reaction products.** Trifunac, A.D. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 16p. NTIS, PC A02/MF A01. Order Number DE83007802.

From NATO Advanced Study Institute conference on fast processes and labile species in chemistry and molecular biology using ionizing radiation; Capri, Italy (7 Sep 1981).

Magnetic resonance methods in radiation chemistry are illustrated. The most recent developments in pulsed EPR and NMR studies in pulse radiolysis are outlined with emphasis on the study of transient radicals and their reaction products. 12 figures.

21280 **(CONF-8109205—4) Radical ions and excited states in radiolysis. Optically detected time resolved EPR.** Trifunac, A.D.; Smith, J.P. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 9p. NTIS, PC A02/MF A01. Order Number DE83007868.

From NATO Advanced Study Institute conference on fast processes and labile species in chemistry and molecular biology using ionizing radiation; Capri, Italy (7 Sep 1981).

Excited-state production and radical-ion recombination kinetics in pulse-irradiated solutions of aromatic solutes in cyclohexane are studied by a new method of optical detection of time-resolved electron paramagnetic resonance (EPR) spectra. 7 figures.

21281 **(CONF-8109205—5) Use of pulse radiolysis to study transient species in the gas phase.** Sauer, M.C. Jr. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 26p. NTIS, PC A03/MF A01. Order Number DE83007828.

From NATO Advanced Study Institute conference on fast processes and labile species in chemistry and molecular biology using ionizing radiation; Capri, Italy (7 Sep 1981).

Examples are chosen from the leterature to show the types of species which have been investigated in the gas phase using the pulse radiolysis technique. The types of processes occurring in pure rare gases and rare gases containing additives are examined. Techniques used to study ion-recombination processes, ion-molecule reactions, and electron capture reactions are discussed and examples of typical results are given. The use of pulse radiolysis to determine rate constants for reactions of atoms and free radicals is also examined. 21 figures, 3 tables.

21282 (INIS-mf—7498, pp vp) **Radiation chemistry of CF_2Cl_2 in the liquid phase.** Alfassi, Z.B. (Ben-Gurion Univ. of the Negev, Beersheba (Israel). Dept. of Nuclear Engineering); Heusinger, H. (Technische Univ. Muenchen, Garching (Germany, F.R.). Lehrstuhl und Inst. fuer Radiochemie). 1982. .

From Nuclear societies of Israel joint annual meeting; Haifa, Israel (16 Feb 1982).

Published in summary form only.

21283 (MPQ—57) IR laser induced reactions: temperature distributions and detection of primary products. Bachmann, F. (Max-Planck-Institut fuer Quantenoptik, Garching (Germany, F.R.)). Dec 1981. 195p. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83750193.

The products of laser-driven pyrolysis in the gas phase often differ drastically from those of conventional pyrolysis. In this work some reasons for this behaviour are considered. First, temperature distributions in cylindrical cells, filled with SF_6 at low pressure and heated by cw CO_2 laser radiation, are calculated by a simple model. The influence of convection is not taken into account. Comparison of theoretical prediction and corresponding experiments included the temperature-dependent absorption cross section. In the second part we describe a molecular-beam sampling system for real time monitoring of primary products in laser-driven reactions. With this system initial tests were made in nonreacting SF_6/rare-gas mixtures. The influence of thermal diffusion was indicated by changes in concentration when the laser was switched on and off. A theoretical treatment is given solving the time-dependent heat-conduction and diffusion equation numerically. As an example for reacting systems, the laser-driven pyrolysis of methanol with SF_6 as an absorber was studied.

21284 (NASA-CR—169000) Poly(aryl ethers) and related polysiloxane copolymer molecular coatings: preparation and radiation degradation. Final report. Mcgrath, J.E. (Virginia Polytechnic Inst. and State Univ., Blacksburg (USA)). May 1982. 27p. NTIS, PC A03/MF A01.

REFS.

The radiation degradation of poly(arylene ether sulfones) and related materials is studied. These basic studies are important both as a means to developing stronger, more stable matrix resins for composite materials, as well as to improve the data base in regard to chemical structure-physical property relationships. Thirty homo and copolymers were synthesized, at least partially characterized and, in several cases suitable film casting techniques were developed. Four samples were chosen for initial radiation degradation. Poly(dimethyl siloxane) soft bocks/segments can preferentially migrate to the surface of copolymer films. Since siloxanes are utilized as thermal control coatings, this form of 'molecular' coating is of interest. The chemistry for preparing such copolymers with any of the polymers described was demonstrated.

21285 (NDRL—2410) University of Notre Dame Radiation Laboratory quarterly report, October 1, 1982-December 31, 1982. (Notre Dame Univ., IN (USA). Radiation Lab.). 1 Feb 1983. Contract AC02-76ER00038. 47p. NTIS, PC A03/MF A01. Order Number DE83006575.

Abstracts are presented of 63 reports in the fields of radiolysis, radiation chemistry, photolysis, and photochemistry. (DLC)

21286 Bibliographies on radiation chemistry. 7. Triplet-triplet absorption spectra: Pt. B (1976 - April, 1982). Carmichael, I.; Hug, G.L. (Notre Dame Univ., IN (USA). Radiation Lab.). *Radiation Physics and Chemistry;* **20**: No. 3, 179-197(1982).

We have compiled a bibliography of papers dealing with triplet-triplet absorption spectroscopy which we hope is reasonably complete through April 1982. The number of references (about 800) has mandated the separation of this list into two parts. Part A included work published before 1976; Part B from then until the above cutoff date. The initial set of references for the current period was obtained as a subset of a profile on transient spectra. The keywords (and logic) chosen were (triplet state and absorption spectra) or triplet-triplet absorption or triplet-triplet transition. Further references were secured from the biologically oriented review of Bensasson et al. We have included only those papers providing quantitative spectral information such as peak locations and extinction coefficients. Studies in which the observation of a known triplet-triplet absorption is used simply as a kinetic tool have generally been omitted. Work in the gas phase has been excluded and we have not covered the theoretical aspects of the phenomenon. The exact identity of the metastable absorber in coordination compounds is generally uncertain and these have also been excluded from consideration although studies on chlorophylls and porphyrins have been retained.

21287 Electron reactions in the pulse radiolysis of metal carbonyls dissolved in 2,2,4-trimethylpentane. Kang, Y.S. (Jackson State Univ., MS (USA)); Holroyd, R.A. (Brookhaven National Lab., Upton, NY (USA)). *Radiation Physics and Chemistry;* **20**: No. 3, 237-240(1982).

The role of electron reactions in the radiolysis of solutions of chromium, molybdenum and tungsten carbonyls in 2,2,4-trimethylpentane was investigated. These compounds are very reactive with the electron and observed rate constants for attachment are: 7,8 and 5 x 10^{13} M^{-1} sec^{-1} for Cr, Mo and W hexacarbonyls, respectively. The spectra of the metal carbonyl anions were studied by both pulse radiolysis and laser photodetachment methods. The data indicate that there is a maximum in the absorption spectra of $Mo(CO)_6^-$ at 412 nm and that the anions of the other hexacarbonyls also absorb in this region. Photodetachment from $M(CO)_6^-$ occurs throughout the visible with thresholds in the IR. The electron affinities of the metal carbonyls are obtained from 3/2's power law plots of the cross section data.

21288 ESR and pulse radiolysis investigation of the radiolysis of sodium vinyl sulfonate. Behar, D.; Fessenden, R.W.; Hornak, J.P. (Notre Dame Univ., IN (USA). Radiation Lab.; Notre Dame Univ., IN (USA). Dept. of Chemistry). *Radiation Physics and Chemistry;* **20**: No. 4, 267-273(1982).

The kinetics of a number of radical reactions involving sodium vinyl sulfonate (SVS) have been studied by pulse radiolysis methods. The initial rate of polymerization of SVS was determined directly by observing the decay of the ESR signal of $HOCH_2CHSO_3^-$ in its reaction with SVS monomer. A rate constant of 7 x 10^4 M^{-1} s^{-1} was found. The same value was found here for acrylate. Reactions of SVS with the primary radicals produced by radiolysis of water were studied by optical absorption methods. Both OH and O^- add to the double bond with rate constants of (3.5 +-0.5) x 10^9 and (3.4 +- 0.5) x 10^8 M^{-1} s^{-1}, respectively. The hydrated electron adds to the double bond with a rate constant of (2.2 +- 0.2) x 10^9 M^{-1} s^{-1}. The electron adduct protonates on carbon to yield $CH_3CHSO_3^-$, the same radical as produced by H atom addition. Steady-state ESR experiments confirm the production of $CH_3CHSO_3^-$ from e^- sub(aq). ESR spectra of the radical adducts $XCH_2CHSO_3^-$ with X = H, OH, CO_2^-, SO_3^- and SO_4^- were obtained in steady-state radiolysis experiments and the magnetic parameters determined.

4007 Radiochemistry And Nuclear Chemistry

REFER ALSO TO CITATION(S) 19843, 22346

21289 (ANL/NESC—321) EXPALS; least squares exponential decay curves. Gardner, C.D. (Lawrence Livermore National Lab., CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048321.

Generally, it is desirable to have at least 10n observations where n equals the number of terms and to input k+n significant figures if k significant figures are expected.

This program fits by least squares a function which is a linear combination of real exponential decay functions. The function is y(k) = summation over j of a(j) * exp(-lambda(j) * k). Values of the independent variable (k) and the dependent variable y(k) are specified as input data. Weights may be specified as input information or set by the program (w(k) = 1/y(k)).CDC7600,6600; FORTRAN IV; SCOPE 2.1; EXPALS requires about 74,062 (octal) words with the maximum number of observations or interpolated values (MMX) set at 200 and the maximum number of values for the lambda calculation (NMX) set at 25.

21290 **(ANL/NESC—322) ISOSEARCH; isotope production flux, cross section calculations.** Friend, C.W.; Lewis, R.E. (Oak Ridge National Lab., TN (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048322.

The program was developed to calculate the unknown reaction cross section, flux value, or product activity in an isotope-production scheme consisting of two or three nuclides.IBM360; FORTRAN IV and BAL.

21291 **(ANL/NESC—324) FRANTIC; least squares fit sum of exponentials.** Strecok, A.J. (Academy of Natural Sciences of Philadelphia, PA (USA). Dept. of Limnology). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048324.

The program is designed to accommodate up to 400 data points for a maximum of 10 component .

FRANTIC is designed to process raw counting data and to fit in the least squares sense these data to the multiple exponential growth and decay equations. The program can be used for sums of exponentials with positive, negative, or zero exponents and positive or negative coefficients.IBM370; FORTRAN IV; OS/370; FRANTIC uses approximately 180K bytes of storage for execution.

21292 **(CONF-8209103—1) New calorimetric studies of inorganic fluorine compounds.** O'Hare, P.A.G.; Flotow, H.E.; Appleman, E.H.; Malm, J.G. (Argonne National Lab., IL (USA)). Apr 1982. Contract W-31-109-ENG-38. 2p. NTIS, PC A02/MF A01. Order Number DE83007677.

From IUPAC conference on thermodynamics; London, UK (7 Sep 1982).

In this paper, recently determined enthalpies of formation are presented for two fluorides, silver(I) uranium(V) fluoride, $AgUF_6$, and cesium fluoroxysulfate, $CsSO_4F$. In addition the derivation of entropy is presented for $CsSO_4F$.

21293 **Method for the preparation of radon-211.** Lambrecht, R.M.; Meyer, G. (to Dept. of Energy). US Patent 4,364,898. 21 Dec 1982. Filed date 10 Oct 1980. vp.

PAT-APPL-195967.

A method for the production of ^{211}Rn comprising bombarding ^{209}Bi with ^{7}Li particles utilizing the nuclear reaction $^{209}Bi(^{7}Li,5n)^{211}Rn$ the method provides a simple spectrum from which ^{211}Rn can be easily isolated in a highly pure condition.

4008 Combustion, Pyrolysis, And High-temperature Chemistry

REFER ALSO TO CITATION(S) 19635, 20867, 21283

21294 **(AD-A—118383/9) Temperature profile of a stoichiometric ch4/N2O flame from laser excited fluorescence measurements on OH.** Anderson, W.R.; Decker, L.J.; Kotlar, A.J. (Army Armament Research and Development Command, Aberdeen Proving Ground, MD (USA). Ballistics Research Lab.). Jul 1982. 45p. NTIS, PC A03/MF A01.

The temperature profile of a stoichiometric CH_4/N_2O flame over a porous plug, atmospheric-pressure burner has been measured using laser excited fluorescence of the OH radical. The technique of rotationally resolved fluorescence excitation scans was extended to the (1,1) vibrational band of the A doublet sigma plus - X doublet pi system to avoid problems of laser beam depletion and self-absorption encountered by this group and previous workers using the (O,O) band. Absorption spectra were obtained in addition to fluorescence spectra. A least squares curve-fitting technique which accounts for the various types of line broadening was developed and applied to two absorption lines in the (O,O) band. The resulting temperature profile is compared to that from fluorescence data reduced using Boltzmann plots. The more complicated curve-fitting approach was later applied to five lines in the spectrum using several combinations of fluorescence and absorption data. Results of all the aforementioned methods were compared to those from OH band reversal and N2 vibrational Raman measurements at the same point in the post flame gases. Excellent agreement was achieved. The results are discussed with emphasis on both the fluorescence diagnostics and the characteristics of the CH_4/N_2O flame on the porous-plug burner.

21295 **(DOE/ER/04939—5) Measurement of radical species concentrations and polycyclic aromatic hydrocarbons in flames by fluorescence and absorption using a tunable dye laser. Progress report, March 1, 1982-February 28, 1983.** Salmon, J.T.; Lucht, R.P.; Ludington, P.D.; Sweeney, D.W.; Laurendeau, N.M. (Purdue Univ., Lafayette, IN (USA). School of Mechanical Engineering). Mar 1983. Contract AC02-78ER04939. 9p. NTIS, PC A02/MF A01. Order Number DE83007983.

The primary goal of this research is to develop quantitative laser fluorescence methods for measuring the concentrations of radical species and polycyclic aromatic hydrocarbons (PAH's) in flames. The accuracy of the fluorescence techniques is evaluated through comparison with independent diagnostic methods. The applicability of the techniques over a range of flame conditions is evaluated by performing the fluorescence experiments in a flat flame burner operated at a variety of flame pressures, temperatures and equivalence ratios. Previously we have reported the demonstration of quantitative laser-saturated fluorescence (LSF) measurements of OH concentration in flames over wide ranges of flame pressure and stoichiometry and described preliminary results for naphthalene and anthracene fluorescence. Since the last report we have: (1) extended the OH analysis to atmospheric pressure methane-air flames under both clean and sooting conditions; (2) conducted LSF measurements of NH in a subatmospheric methane-nitrous oxide flame; (3) developed a technique for measuring the concentrations of PAH's in vapor state mixtures; and (4) detected hydrogen atom fluorescence in a flame for the first time using a two-photon absorption process. 4 figures.

21296 **(DOE/PC/30292—8) Synthetic-fuel combustion: pollutant formation. Soot-initiation mechanisms in burning aromatics. Final report, 19 September 1980-18 September 1982.** Rawlins, W.T.; Tanzawa, T.; Schertzer, S.P.; Krech, R.H. (Physical Sciences, Inc., Andover, MA (USA)). Jan 1983. Contract AC22-80PC30292. 155p. NTIS, PC A08/MF A01. Order Number DE83005611.

This report describes experimental studies of soot initiation in the pyrolysis and combustion of the aromatic model fuels toluene and pyridine. These molecules were chosen as generic examples of the aromatic component of synthetic fuels which is thought to dominate soot formation in combustion of these fuels. The experiments were conducted in a shock tube over the ranges 1300 to 2500°K and 0.2 to 0.8 atm, using optical diagnostics to monitor the appearance of soot particles and the kinetic behavior of several gas phase species. Major results of this study include (1) validation of the applicability of optical diagnostics in sooting systems; (2) observations of strong influence of fuel molecular structure on sooting behavior; and (3) postulation of a conceptual sooting mechanism to account for the existing data base. 66 figures, 6 tables.

21297 **(N—82-23466) Numerical methods and calculations for droplet flow, heating and ignition.** Dwyer, H.A.; Sanders, B.R.; Dandy, D. (California Univ., Davis (USA). Dept. of Mechanical Engineering). Mar 1982. 8p. (CONF-811174—). NTIS, PC A17/MF A01.

From 2. convention of the international colloquium on drops and bubbles; Monterey, CA, USA (19 Nov 1981).

In JPL proceedings of the 2nd International Colloquium on Drops and Bubbles, March 1982, pp 358-365 see N82-23418.

A numerical method was devised and employed to solve a variety of problems related to liquid droplet combustion. The basic transport equations of mass, momentum and energy were formulated in terms of generalized nonorthogonal coordinates, which allows for adaptive griding and arbitrary particle shape. Example problems are solved for internal droplet heating, droplet ignition and high Reynolds number flow over a droplet.

21298 (N—8228576) A comprehensive model to determine the effects of temperature and species fluctuations on reaction rates in turbulent reacting flows. Chinitz, W.; Foy, E.; Rowan, G.; Goldstein, D. (Cooper Union, New York, NY). Jul 1982. 64p. (NASA-CR—169124). NTIS, PC A04/MF A01.

The use of probability theory to determine the effects of turbulent fluctuations on reaction rates in turbulent combustion systems is briefly reviewed. Results are presented for the effect of species fluctuations in particular. It is found that turbulent fluctuations of species act to reduce the reaction rates, in contrast with the temperature fluctuations previously determined to increase Arrhenius reaction rate constants. For the temperature fluctuations, a criterion is set forth for determining if, in a given region of a turbulent flow field, the temperature can be expected to exhibit ramp like fluctuations. Using the above results, along with results previously obtained, a model is described for testing the effects of turbulent fluctuations of temperature and species on reaction rates in computer programs dealing with turbulent reacting flows. An alternative model which employs three variable probability density functions (temperature and two species) and is currently being formulated is discussed as well.

21299 (N—8230219) OD3P report. Status report. Hunter, S.C. (KVB, Inc., Irvine, CA (USA)). Mar 1982. 18p. KVB, Inc., Irvine, CA.

The numerical method was modified in a manner that substantially improved the accuracy of gas-phase kinetic reaction and gas-particle velocity and thermal lags, meeting the program objectives of conservation errors of less than 0.1 percent, while at the same time reducing the computer time required. These improvements and better method for starting conditions at the nozzle inlet, based on particle asymptotic fractional lag are discussed.

21300 (PB—82-238452) Quantification of fire properties of fuels and interaction with fire environment. Technical report. Tewarson, A. (Factory Mutual Research Corp., Norwood, MA (USA)). Jun 1982. 39p. NTIS, PC A03/MF A01.

Concepts for the quantification of fire properties of fuels and interaction with fire environments are presented. It is shown that certain fire properties, i.e., actual heat of combustion and yield of fire products, are independent of fire size as long as the fire remains overventilated. Small-scale measurements of asymptotic values of generation rates of fuel vapors and fire products, per unit area of fuel, obtained by oxygen enrichment, are shown to agree reasonably well with the generation rates measured directly on a large scale in ambient air.

21301 (PB—83-107813) Combustion research needs. Smoot, L.D.; Hill, S.C. (Brigham Young Univ., Provo, UT (USA). Dept. of Chemical Engineering). Mar 1982. 90p. NTIS, PC A05/MF A01.

A six-month study to survey the state-of-the-art in combustion research is summarized. Included is a review of the literature and discussions on coal gasification, explorations, fires, liquid and solid fossil fuels, reciprocating and turbine engines, and solid propellants. Fundamental combustion areas are examined, including the chemistry of combustible materials, combustor modeling, diagnostics and instrumentation, droplet and gas phase kinetics, and fluid mechanics. Results are presented of a survey of professionals who recommended research needs in the areas of turbulence/fluid mechanics, diagnostics/instrumentation, and combustor modeling. Evaluations of this document by two combustion researchers are included.

21302 (SAND—83-8208) Fundamental combustion and diagnostics research at Sandia. Progress report, October-December 1982. Mattern,, P.L.; Gusinow, M.A. (Sandia National Labs., Livermore, CA (USA)). Feb 1983. Contract AC04-76DP00789. 60p. NTIS, PC A04/MF A01. Order Number DE83008258.

The Department of Energy/Office of Basic Energy Sciences, through the Division of Chemical Sciences/Fundamental Interactions Branch, has established a Combustion Research Facility at Sandia National Laboratories, Livermore, California. The long-term research carried out at this Facility emphasizes fundamental studies which have the potential to impact practical combustion. A special emphasis is given to the development and application of advanced research methods, taking advantage of the latest progress in laser and computer technologies. Included here are quarterly reports on the research sponsored by the Division of Chemical Sciences/Fundamntal Interactions Branch. The first section presents progress on flame research, the second section details researdh in combustion chemistry and modeling, the third section describes rreesults in diagnostics research, and the fourth section provides technical highlights on resources develped and made available at the Combustion Research Facility.

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4201 General Engineering

21303 (NP—3901368) Report for 1979-1980, 1980-1981 of the Division of Engineering and Applied Science at the California Institute of Technology. (California Inst. of Tech., Pasadena (USA)). 1981. 154p. CALTECH, California Inst. of Tech., 1201 East California Boulevard, Pasadena 91125.

This volume discusses new activities at the Division of Engineering and Applied Science at Caltech, lists its Sherman Fairchild Distinguished Scholars and all instructional staff, and reports on research projects in the following subject areas: aeronautics; applied mathematics; mechanical civil, electrical and environmental engineering; materials science; applied and biofluid mechanics; materials science; applied physics; bioinformation systems; and computer science. (LCL)

4202 Facilities And Equipment

REFER ALSO TO CITATION(S) 19609, 19658, 19664, 19723, 19741, 19802, 19808, 19809, 19810, 19814, 19877, 19953, 20881, 21052, 21557, 21652, 21923, 22701, 22766

21304 (AD-A—115170/3) 200 kj copper foil fuses. Final report. McClenahan, C.R.; Goforth, J.H.; Degnan, J.H.; Henderson, R.M.; Janssen, W.H. (Computer Sciences Corp., Albuquerque, NM (USA)). Apr 1980. 59p. NTIS, PC A04/MF A01.

A 200-kJ, 50-kV capacitor bank has been discharged into 1-mil-thick copper foils immersed in fine glass beads. These foils ranged in length from 27 to 71 cm and in width from 15 to 40 cm. Voltage spikes of over 250 kV were produced by the resulting fuse behavior of the foil. Moreover, the current turned off at a rate that was over 6 times the initial bank dI/dt. Full widths at half maxima for the voltage and dI/dt spikes were about 0.5 microsec, with some as short as 300 nanosec. Electrical breakdown was prevented in all but one size fuze with maximum applied fields of 7 kV/cm. Fuses that were split into two parallel sections have been tested, and the effects relative to one-piece fuses are much larger than would be expected on the basis of inductance differences alone. A resistivity model for copper foil fuses, which differs from previous work in that it includes a current density dependence, has been devised. Fuse behavior is predicted with reasonable accuracy over a wide range of foil sizes by a quasi-two-dimensional fuse code that incorporates this resistivity model. A variation of Maisonnier's method for predicting optimum fuze size has been derived. This method is valid if the risetime of the bank exceeds 3 microsec, in which case it can be expected to be applicable over a wide range of peak current densities.

21305 (AD-A—115516/7) Soft photon effects on vacuum power flow. Master's thesis. Mitchell, O.J.; Blaher, R.J. (Air Force Inst. of Tech., Wright-Patterson AFB, OH (USA). School of Engineering). Dec 1981. 62p. (AFIT/GE/EE—81D-12). NTIS, PC A04/MF A01.

Understanding the physical processes of high power electrical energy is of major importance for the advancement of state-of-art directed energy, simulation and confined fusion programs. Generation of high voltage, short duration pulses may result in high energy density plasma which produces quantities of VUV and soft

X-ray photons in the range of 0.15-10 ev. Power transport down vacuum lines presents two problems which must be dealt with in every application-insulator flashover and electrode gap closure. The pulsed flashover and ablative closure mechanisms under soft VUV photon fluence are described. Two tests were conducted. First, an insulator surface was subjected to VUV photons (0.5 ev) using apertures of 0.0156 to 0.5 inches in diameter with and without a quartz window. The apertures had no effect in inhibiting a flashover; however, the quartz window prevented the occurrance of insulator flashover. Second the gap closure rate of copper electrodes under the photon fluence of 6 x 10'9 watts per square meter was measured. A gap closure rate of 0.35 cm/microsecond was determined for the copper electrodes.

21306 (ANL/NESC—80R) SOR3; stress analysis of shells of revolution. Fitch, J.R.; Fagan, R.L. (Knolls Atomic Power Lab., Schenectady, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048080.

Maxima of - 30 shells into which the structure is divided 30 input points for the shell 10 points at which detailed stress printout is to be provided for brittle fracture purposes; .

SOR3 is used for the analysis of symmetrically loaded shells of revolution. The program computes stresses, strains, forces and deflections produced by thermal and mechanical loads. Normal and transverse shear stresses and wall thickness changes are taken into account. The program is based on constitutive equations which retain terms through the second order in the ratio of the thickness to the local radii of curvature. These features make the program applicable to shell structures with moderately large thickness to radius ratios.CDC6600; FORTRAN IV; SCOPE 3.0.

21307 (ANL/NESC—251) SAFE-AXISYM; stress analysis of axisymmetric load. Wang, C.L. (Institute of Nuclear Energy Research, Lung-Tan (Taiwan)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048251.

SAFE-AXISYM is a program for the analysis of multi-material axisymmetric composite structures. It is designed for the analysis of heterogeneous structures such as reinforced and prestressed concrete vessels. The structure is assumed to be linearly elastic, and only bodies of revolution subjected to axisymmetric loading can be treated.CDC CYBER73;CDC7600; FORTRAN IV; NOS 1.3 (CDC CYBER73), SCOPE 2.1 (CDC7600); 62,000 (octal) words of memory are required for execution.

21308 (ANL/NESC—252) SAFE-PLANE; plane stress analysis, two-dimensional bodies. Cornell, D.C. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048252.

Multi-material structures with varying rigidities converge very slowly. Not valid for incompressible materials. Maximum number of nodal points = 675. Maximum number of elements = 1350.

SAFE-PLANE is applied to two-dimensional structures of arbitrary geometry under in-plane loads. Either plane stress or plane strain conditions may be imposed. Mechanical and thermal loads are permitted.UNIVAC1108;CDC6600; FORTRAN IV; Approximately 47000 words storage (decimal) plus the operating system (1108). Requirements can be easily reduced by simple adjustment of DIMENSION statements.

21309 (ANL/NESC—253) SAFE-SHELL; stress analysis of thin shells. Cornell, D.C. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048253.

Maxima of - 181 nodal points 180 elements 21 sections 20 nodes per section Capacity can be easily increased at cost of storage requirements .

SAFE-SHELL is used to design and analyze axisymmetric thin-shell structures of arbitrary generatrices under axisymmetric mechanical and/or thermal loading conditions. The intersection of two or more shells can be treated.UNIVAC1108;CDC CYBER73;CDC7600; FORTRAN IV; EXEC8 (UNIVAC1108), NOS 1.3 (CDC CYBER73), SCOPE 2.1 (CDC7600); The UNIVAC1108 version requires 26,000 words of memory and the CDC CYBER73 version requires 76,000 (octal) words of memory for execution.

21310 (ANL/NESC—282R) SEALSHELL2;M0110; shell stress analysis for axisymmetric loading. Friedrich, C.M. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048282.

The SEALSHELL2 program determines stresses, strains, deflections, and reactions in a thick shell of revolution with axisymmetric loading. The loading consists of a temperature distribution, inside and outside pressure distributions, and circumferential forces and moments applied to the middle surface. The shell is linear-elastic with tensile, bending, and shear strains.CDC6600,7600;IBM360; FORTRAN IV; SCOPE 2.0 (CDC6600) and OS/360 (IBM360); 32K memory (CDC6600), 65K (octal) words memory (CDC7600), 185K bytes memory (IBM360).

21311 (ANL/NESC—283R) M0552; dynamic analysis of linear elastic systems. Zanoni, E.A. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048283.

The total number of points used to describe the transient is limited to 2000. An option is provided to enable specification of a general trigonometric series having up to 20 terms, as the transient. The number of modes and mass points that can be considered is limited to 50.

M0552 solves the transient response problem of linear elastic, lumped-mass systems subjected to a unidirectional foundation transient that can be either a velocity or acceleration transient. Normal mode theory is used and the input to the program consists of the mode shapes, frequencies, and foundation transient. Element effects are also evaluated as a function of time. Modal damping coefficients may be specified.CDC6600; FORTRAN IV; SCOPE 2.0; Input tape, output tape, 2 scratch tapes, printer, CDC-280 microfilm plotter.

21312 (ANL/NESC—296) GRDWRK; grid generation for safe programs. Doering, D.A. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048296.

GRDWRK generates as punched output the basic finite element reference grid work for the SAFE codes. This generated grid consists of triangular elements and nodes, uniaxial elements, such as reinforcement bars, tendons, and anchors, and biaxial membranes, such as any thin shell or liner. The punched output serves as direct input data to the SAFE codes.UNIVAC1108; FORTRAN IV; EXEC2, GAX23B through GAX27; 20,100 words plus operating system.

21313 (ANL/NESC—329R) M0457;PIPE; elastic stress of piping system. Friedrich, C.M. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048329.

Maxima of - 100 positions to locate forces and elements 20 force-trails 25 applied loads 50 total loads 20 joint-condition loads 20 sets of material properties 20 sets of stiffness data 99 elastic elements.

PIPE performs an elastic stress analysis of a 3-dimensional piping structure with thermal stresses, redundant loops, and concentrated loads.CDC6600; FORTRAN IV; 100,000 (octal) central memory and 3 tapes (input, output, storage).

21314 (ANL/NESC—332) SAFE-3D; three-dimensional composite structure stress study. Cornell, D.C.; Jadhav, K. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048332.

Maxima of - 5000 nodes 16000 elements The program cannot be applied to incompressible solids and is not recommended for Poisson's ratio in the range of nu between 0.495 and 0.5.

SAFE-3D is a finite-element program for the three-dimensional elastic analysis of heterogeneous composite structures. The program uses the following types of finite elements - (1) tetrahedral elements to represent the continuum, (2) triangular plane stress membrane elements to represent inner liner or outer case, and (3) uniaxial tension-compression elements to represent internal reinforcement. The structure can be of arbitrary geometry and have any distribution of material properties, temperatures, surface loadings, and boundary conditions.UNIVAC1108;IBM360; FORTRAN IV (UNIVAC1108), FORTRAN IV and BAL (IBM360); EXEC2, GAX33A (UNIVAC1108) and OS/360 (IBM360); 52K fast memory storage and 8,000,000 auxiliary storage for the UNIVAC1108.

21315 (ANL/NESC—337R) STEM; matrix generation for a system of beams. Duffy, P.E.; Carlson, F.C. (Knolls Atomic Power Lab., Schenectady, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048337.

The program is limited to a system of 14 beams. The maximum matrix size is 120 by 120. The number of beams plus the number of segments in one case cannot exceed 60.

STEM calculates and punches out partially-coupled mass, stiffness, and internal load function matrices for a structural system of beams having prismatic segments. Shear deformation and rotational inertia are included in the calculations.CDC6600; FORTRAN IV; SCOPE 3.2; Field length of 50,000 octal.

21316 (ANL/NESC—344R) GEM; eigenvalue problem for vibrating systems. Fagan, R.L.; McCalley, R.B. (Knolls Atomic Power Lab., Schenectady, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048344.

Maxima of - 60 degrees of freedom (VEP) 98 commands per case.

GEM is intended primarily to perform vibration studies with the capability of generating input for the VEP (vibration eigenvalue problem) routine and performing additional operations on the output from the SHO (shock) segment. Given a system of masses and springs, the VEP routine computes the natural frequencies of the vibrating system as well as the mode shapes for each frequency. Given the mode shapes, frequencies, and masses of a vibrating system, the SHO routine will compute the deflections and forces at the mass points.CDC6600; FORTRAN IV and ASCENT; SCOPE 2.0.

21317 (ANL/NESC—348R) TOPS; transient thermodynamics of pressurizers. Redfield, J.A. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048348.

Source deck (1703 cards) Sample problem (49 cards) Reference report, WAPD-TM-545.

The TOPS program is a digital simulation of pressurizer dynamics based on a rigorous application of the first law of thermodynamics and phenomological heat and mass transfer laws with empirically determined coefficients. The program is useful in studying the thermodynamic paths of pressurizer transients and is convenient to use as a design tool.CDC6600; FORTRAN IV; SCOPE 2.0; Approximately 100,000 octal locations.

21318 (ANL/NESC—373R) BL47; drafting tool to plot plane structures. Friedrich, C.M.; Cullens, J.J. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048373.

BL47 is a plotting routine designed for plane structures that are to undergo stress analysis. Points and lines are input in various parametric forms, and curved segments are drawn between given points along the given lines. The program may be used as a drafting tool to construct engineering drawings. BL47 uses three points on a straight line segment to obtain dimensions for SEALSHELL2 (NESC Abstract 282) input data.CDC6600; FORTRAN IV; SCOPE; 20,000 words of high-speed memory.

21319 (ANL/NESC—378R) TUBE; u-tube heat exchanger stress analysis. Spivak, A.E.; Lechliter, G.L. (Knolls Atomic Power Lab., Schenectady, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048378.

TUBE solves for the stresses due to pressure and temperature in a U-tube type heat exchanger. Specifically, it handles a configuration consisting of a spherical head, primary transition cylinder, and secondary cylinder. The transition cylinders may be conical and tapered in thickness, but the remaining shells are of uniform thickness. The spherical head and the transition cylinders may be omitted from a problem.CDC6600; FORTRAN IV.

21320 (ANL/NESC—379) SAFE-2D; plane & axisymmetric stress analysis. Cornell, D.C. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048379.

Maxima of - 2 degrees of freedom (radial or horizontal translation and axial or vertical translation) 1200 nodal points 2400 finite elements.

SAFE-2D performs the elastic stress analysis of general axisymmetric, plane, and combined axisymmetric and plane composite structures.UNIVAC1108; FORTRAN IV; EXEC2; SAFE-2D requires 50K, fast memory storage, and 500,000 words of auxiliary storage..

21321 (ANL/NESC—383R) M0266; linear elastic structural dynamics. Wenzel, W.A. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048383.

M0266 is limited to a 50 x 50 mass-flexibility matrix. Other maxima include - 50 masses plus redundants 20 redundants 999 flexible elements 20 effects per element The dynamic analysis is limited to a spectrum-type analysis, which is limited to a one-directional motion of the foundation.

M0266 computes the dynamic shock forces and modal frequencies acting on a lumped mass, linear elastic model of a structure subjected to shock spectrum inputs. The model employed is a collection of lumped masses connected by weightless flexible elements. If the original structure is not statically determinate, redundant forces must be introduced to ensure a primary structure that is.CDC6600; FORTRAN IV; SCOPE 3.1; 105,000 (octal) locations, input tape, output tape, one scratch tape, and printer.

21322 (ANL/NESC—397R) GAPL3; inelastic large deflection stress study. Thurman, A.L. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048397.

The thickness of the plate or shell should fall within the limits of thin shell theory.

GAPL3 determines the inelastic, large-deflection behavior of thin plates or axially symmetric shells with pressure loading and deflection restraints.CDC6600; FORTRAN IV and Assembly language; SCOPE; Minimum core storage of 100,000 (octal) words, a printer, an on-line punch, and a plotter.

21323 (ANL/NESC—402R) SABOR4; discrete-element analysis of thin shells. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy, J.H.; Berg, B.A. (Massachusetts Inst. of Tech., Cambridge (USA). Aeroelastic and Structures Research Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048402.

SABOR4 is a discrete element displacement program for the linear-elastic, static, load-deflection analysis of meridionally-curved, variable-thickness, branched, thin shells of revolution which may be subjected to concentrated or distributed external loading and to isothermal or nonuniform temperature conditions. The program consists of five primary subprograms - HAL4, MELT4, LANCE4, MAINS4, and SUMPLOT4. Three of these (HAL4, MELT4, and LANCE4) process external-mechanical-load or thermal-load data to determine the generalized nodal forces for each discrete element. MAINS4 computes the discrete-element stiffness and mass matrices and forms these matrices for the assembled structure. SUMPLOT4 calculates the other quantities of interest, sums contributions from various loading harmonics, and prepares results for CalComp plotting.IBM360; FORTRAN IV; OS/360.

21324 (ANL/NESC—404R) FINEL; finite-element study in two,-and three-dimensonal structures. Jordan, W.B.; Grieb, L.A. (Knolls Atomic Power Lab., Schenectady, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048404.

FINEL2 maxima - 2000 nodes 1000 elements 4 types of materials 10 different materials of each type 100 groups 500 forces of any one type (x, y, or slant) 500 boundary conditions of any one type FINEL3 maxima - 30 nodes per group if the number of dimensions is 2 20 nodes per group if the number of dimensions is 3 100 groups 1000 elements.

FINEL is a collection of three programs for the calculation of the elastic and plastic behavior of structures. The structures are built up from plates and bars, which can be arranged in either 2-dimensional or 3-dimensional assemblies. The plates can be in plane stress or plane strain. FINEL2 handles 2-D structures only. FINEL3 can handle both 2- and 3-D structures, but is slower.CDC6600; FORTRAN IV; CHIPPEWA.

21325 (ANL/NESC—406) DATATRAN2 RAD1 Geometry Modules; radial geometry modules for two-dimensional imput. Bean, R.H.; Kopp, H.J. (Knolls Atomic Power Lab., Schenectady, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048406.

Curves are limited to straight-line approximations in most modules and to second-order curves in principal modules. The total geometric complexity is not limited.

This series of DATATRAN modules is designed to provide the computerized two-dimensional geometry descriptions required for engineering and nuclear design computations. The modules communicate via DATATRAN N-dot datasets, and the user must link the appropriate modules to perform a specific task. Modules are designed to accept as input data transcribed from engineering drawings, to plot, check, and edit the generated geometric data, and to calculate moments of inertia and area intersections.CDC6600,7600; FORTRAN (90%), COMPASS (5%), DATATRAN2 (5%); DATATRAN2 with SCOPE 3.1, 3.2, 3.3 or SCOPE 3.4 (CDC6600), SCOPE 1.1 (CDC7600).

21326 (ANL/NESC—407) DATATRAN2 Utility Plotting Modules; utility plot modules f(x) & f(x,y). Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Binney, E.J. (Knolls Atomic Power Lab., Schenectady, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048407.

There is a limit of approximately 8,000 points per curve for functions of one variable and 16,000 points for functions of two variables.

This series of DATATRAN modules is designed to provide basic plotting capability in an easy-to-use package. Functions of one or two variables can be accommodated. The modules may be used to plot results of calculations performed by other modules or to display data read from cards or tapes.CDC6600,7600; FORTRAN (80%), COMPASS (15%), DATATRAN2 (5%); SCOPE 3.1, 3.2, 3.3 or SCOPE 3.4 (CDC6600), SCOPE 1.1 (CDC7600).

21327 (ANL/NESC—412R) MANE1; rectangular magnetic network solution. Guerdan, D.A.; Marlowe, O.J. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048412.

The network consists of a number of major rectangles of loops connected to each other in a cyclic fashion.

The MANE1 program finds the magnetic flux in each branch of a magnetic network consisting of a number of branches of iron and air. The problem is one step in the design of slow speed reluctance motors in which the magnetic flux is determined in all component parts for a position of the rotor with respect to the stator.CDC6600; FORTRAN IV; SCOPE 3; For small problems, lr = 18, 35,000 (octal) core locations are required. For large problems, lr = 80, 154,000 (octal) locations are required..

21328 (ANL/NESC—434) HEATMESH; geometrical data heat transfer study. Gabrielson, V.K. (Sandia National Labs., Livermore, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048434.

HEATMESH is used to generate geometrical data required for studies of heat transfer in axisymmetric structures represented as surfaces of revolution. The program consists of two distinct phases. The first subdivides the given parts into a nodal network and evaluates the geometrical properties of the nodes. The second determines adjacent nodes and edits geometrical data for the thermal model.CDC6600; FORTRAN IV; SCOPE.

21329 (ANL/NESC—450) KENO2;KENO4; Monte Carlo multigroup criticality code. Dickinson, D. (Dow Chemical Co., Golden, CO (USA). Rocky Flats Div.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048450.

KENO4 is flexibly dimensioned so that the allowed size of a problem is limited only by the total data storage available. A method for determining the size of a problem is included in reference 8.

KENO is a multigroup, Monte Carlo criticality code containing a special geometry package which allows easy description of systems composed of cylinders, spheres, and cuboids (rectangular parallelepipeds) arranged in any order with only one restriction. Each geometrical region must be described as completely enclosing all regions interior to it. For systems not describable using this special geometry package, the program can use the generalized geometry package (GEOM) developed for the O5R Monte Carlo code. It allows any system that can be described by a collection of planes and/or quadratic surfaces, arbitrarily oriented and intersecting in arbitrary fashion. Rectangular arrays of fissile units are allowed with or without external reflector regions. Output from KENO consists of keff for the system plus an estimate of its standard deviation and the leakage, absorption, and fissions for each energy group plus the totals for all groups. Flux as a function of energy group and region and fission densities as a function of region are optional output.IBM360;CDC6600; FORTRAN IV and Assembly language (IBM360), FTN FORTRAN with COMPASS subroutine (CDC6600); OS/360 (IBM360) and SCOPE 3.3 (CDC6600); The CDC6600 program requires 64K words of fast core, a disk facility or one or more tape units. The IBM360 version of KENO2 requires approximately 64K words of fast core, a disk facility or one or more tape units. The IBM360 version of KENO4 requires 1 to 6 scratch units besides the standard input/output units and a minimum of about 200K core.

21330 (ANL/NESC—863R) **WHIP1; structural deflection due to blowdown.** Murphy, J.H. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048863.

Maxima of - 200 time-steps 50 input cards 20 alternate force and time pairs Minima of - 14 input cards 2 alternate force and time pairs.

WHIP1 calculates the dynamic behavior of a pipe or membrane under the influences of an externally applied force, taking into account the elastic-plastic properties and the inertia of the member. WHIP1 prints the values of important variables at each time-step and graphs of these variables as output. The program was written to compute pipe deflection, or 'pipe whip' due to rupture and the ensuing blowdown process.CDC6600,7600; FORTRAN IV; SCOPE; 25,000 (octal) words of memory for the CDC6600 or 11,000 (octal) words of memory for the CDC7600.

21331 (BMFT-FB-T—81-107) **Development of cryorefrigerators. Final report, September 1980.** Klein, H.H. (Leybold-Heraeus G.m.b.H. und Co. K.G., Koeln (Germany, F.R.)). Jun 1981. 63p. (In several languages). NTIS, PC A04/MF A01.

Bundesministerium fuer Forschung und Technologie REFS Sponsored by Bundesministerium fuer Forschung und Technologie.

Two types of two-stage Gifford-McMahon- (GM) Refrigerators were developed with different cooling capacities. The GM Refrigerator consists of two components: the coldhead, which produces the cooling capacity, and the compressor unit, which delivers the high pressure helium for the GM-cycle. The design of the coldhead and the compressor unit are described and a short theory of the GM-cycle is presented. Details of the most critical parts such as regenerators, seals at low temperature, dynamic seals, and oil separators are given.

21332 (CONF-810497—3) **Evaluation of the Argonne multi-tube hydride heat exchanger.** Sheft, I., Lamich, G. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 15p. NTIS, PC A02/MF A01. Order Number DE83007773.

From International symposium on metal-hydrogen systems; Miami Beach, FL, USA (13 Apr 1981).

The Argonne multi-tube hydride heat exchanger uses a tubular design hydride bed with the alloys contained in the interstices of open pore aluminum foam for enhanced heat transfer. The alloys, $MmNi_{4\ 15}Fe_{0\ 85}$ (INCO HY-STOR 209) and $LaNi_{4\ 7}Al_{0\ 3}$ (INCO HY-STOR 207) are sealed into aluminum capsules with filters crimped onto the ends. The capsules are contained in the ends of a stainless steel tube and are separated by an empty capsule. H_2 flows in the annular space within the steel tube from one alloy to the other. Ten tubes are combined forming a bundle heat exchanger. Transfer of H_2 from HY-STOR 207 ($LaNi_{4\ 7}Al_{0\ 3}$) at 110C to HY-STOR 209 ($MmNi_{4\ 15}Fe_{0\ 85}$) at 6°C, 10°C or 15°C and then back to HY-STOR 207 at 40°C was determined from thermal effects of H_2 sorption on the alloys. Although the H_2 transferred is greater for greater temperature differences, the measured amount of H_2 transferred is less than expected. This is most likely due to poor heat transfer across the gas space between the aluminum can and the stainless steel tube. As the temperature of the alloy bed equilibrates with the heat transfer fluid, H_2 continues to transfer, but at a rate too slow to have a noticeable effect on the measured heat. With a fluid flow rate of 5 l/min and a temperature resolution of 0.1°C, the limit of observable thermal effect is approximately 0.5 kcal/min, about 0.1 mole H_2/min. For comparison, H_2 the sensible heat transfer is about 2.0 to 2.5 kcal/min for H_2 transfer from HY-STOR 207 to HY-STOR 209 and about 1.0 kcal/min for transfer in the reverse direction. The similarity of the H_2 transfer rates in the two directions in spite of the large pressure ratio difference implies the adequacy of the temperature range used. The relatively rapid measured hydrogen transfer implies that the filters are not plugged and the alloys are not significantly oxidized.

21333 (CONF-821168—1) **Effect of impure refrigerants on evaporative chillers.** Bukacek, R.F.; Tahir, T.B. (Institute of Gas Technology, Chicago, IL (USA)). 1982. 8p. Inst. of Gas Tech., 3424 South State Street, IIT Center, Chicago, IL 60616.

From 4. cryogenics intersociety symposium; Los Angeles, CA, USA (14 Nov 1982).

A simulation of multilevel serial-fed evaporative refrigeration systems was constructed to assess the magnitude of the effects of refrigerant contaminants on evaporator temperatures, cooling performance, condensing pressures and horesepower requirements. The assumptions made for the simulation and the equations developed are discussed. Results are presented for a system loaded with a multicomponent refrigerant containing 2.5% ethane, 95% propane and 2.5% butane. The tabulated results show: the segregation of components that takes place when a multicomponent refrigerant is used in such systems; the composition of the vapor leaving the evaporators and of the vapor to the accumulator; the shift in temperature levels in the evaporators caused by refrigerant impurities; and the consequent changes in evaporator duties. It is concluded that impurities in the refrigerant can limit the maximum system capacity. (LCL)

21334 (CONF-8010206—Vol.1, pp 147-149) **Optimization of the parameters of superconducting dipole winding front parts.** Dojnikov, N.I.; Sychevskij, S.E.; Titov, V.A. (Nauchno-Issledovatel'skij Inst. Ehlektrofizicheskoj Apparatury, Leningrad (USSR)). 1981. (In Russian). Joint Inst. for Nuclear Research, Dubna, USSR.

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

To provide field homogeneity in the superconducting dipole (SCD) aperture, numerical simulation of spatial fields for SCD with the double-layer saddle-type coil of the shell type is carried out. The problem is reduced to restriction of maximum induction in the end-connector parts of the coil. The method permitting to regard for location and dimensions of the magnetic curcuit and exciting coil is used in calculations. To determine the induction distribution of the magnetostatic field the method of modified scalar potential is used. It is found that the maximum value of induction in end-connector parts of the dipole is on the inner surface of the coil layer. It is shown that the decrease of the maximum of induction in the coil can be obtained by removing the end-connector parts of the coil from the screen or introducing substrates between the loops in the end-connector parts of the lower coil layer.

21335 (DOE/PC/40804—T5) **Measurement of solids motion in gas-fluidized beds. Technical progress report, 1 October 1982-31 December 1982.** Chen, M.M.; Chao, B.T. (Illinois Univ., Urbana (USA). Dept. of Mechanical and Industrial Engineering). 1982. Contract FG22-81PC40804. 28p. NTIS, PC A03/MF A01. Order Number DE83006969.

This technical progress report covers the progress made during the fifth quarter of the project entitled Measurements of Solids Motion in Gas Fluidized Beds under Grant No. DOE-F22-81PC40804 during the period 1 October through 31 December 1982. The research concerns the measurement of solids particle velocity distribution and residence time distribution using the Computer-Aided Particle Tracking Facility (CAPTF) at the University of Illinois at Urbana-Champaign. The experimental equipment and measuring methods used to determine particle size distribution and particle motion and the results obtained are presented.

21336 **(ESA-TT—721) Helium 2 cooling systems with long service live for space use: phase separation hybrid cooling systems.** Klipping, G.; Klipping, I.; Schmidtchen, U. (European Space Agency, 75 - Paris (France)). Mar 1982. 47p. NTIS, PC A03/MF A01.

Transl. into ENGLISH from Helium-II-Kuehlsystem mit langen Srandzeiten fuer Weltraumanwendungen. Phasentrennung, Hybrid-Kuehlsytem , Freie Univ. (Berlin) Sep. 80 REFS.

Phase separation in zero gravity is discussed and the active phase separator for a liquid helium cooled infrared observatory for Spacelab is described. For long-term (more than one year) applications, a hybrid cooling system is required in which refrigerants boiling at higher temperatures are employed. The suitability of hydrogen and neon are investigated as well as that of a secondary solid refrigerant. Analysis indicates that such a hybrid cooling system, using solid neon, can be realized and has substantial advantages compared with a one-stage He2 cooling system.

21337 **(KFK-PDV—199) High-speed flute grinding machine for twist drills and similar fluted tools.** Alber, P.; Schweizer, G.; Guehring, K.; Seit, H. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Projekt Prozesslenkung mit DV-Anlagen). Jan 1981. 207p. (In German). NTIS (US Sales Only), PC A10/MF A01. Order Number DE82902709.

The manufacturing techniques of fluted machining tools currently used are either flute milling or non-cutting processes. The increasing diversity in the range of drilling tools forces the development of a new technology. The design of tools must increase their efficiency, precision and their specific application. When applying the high speed grinding technique with cutting rates of up to 100 m/s peripheral wheel speeds, a technology can be developed which exceeds the machining performance of the so far known milling process by 15 times. The target of the project is to be seen in the development of a grinding machine for flute and body clearance grinding of twist drills and similar fluted tools. With the application of the high speed grinding technique the machining time will be reduced. With the aid of a computer supported tool design, the setting data for the machine will be processed and thus the setting-up times reduced. The objective of the development work has to be seen in the realization of a flute and body clearance grinding machine offering short machning times and flexibility with regard to setting-up.

21338 **(LA—9466-MS-Rev.) Los Alamos National Laboratory Building Cost Index.** Orr, H.D.; Lemon, G.D. (Los Alamos National Lab., NM (USA)). Jan 1983. Contract W-7405-ENG-36. 6p. NTIS, PC A02/MF A01. Order Number DE83007125.

The Los Alamos National Laboratory Building Cost Index indicates that actual escalation since 1970 is near 10% per year. Therefore, the Laboratory will continue using a 10% per year escalation rate for construction estimates through 1985 and a slightly lower rate of 8% per year from 1986 through 1990. The computerized program compares the different elements involved in the cost of a typical construction project, which for our purposes, is a complex of office buildings and experimental laboratores. The input data used in the program consist primarily of labor costs and material and equipment costs. The labor costs are the contractural rates of the crafts workers in the Los Alamos area. For the analysis, 12 field-labor draft categories are used; each is weighted corresponding to the labor craft distribution associated with the typical construction project. The materials costs are current Los Alamos prices. Additional information sources include material and equipment quotes obtained through conversations with vendors and from trade publications. The material and equipment items separate into 17 categories for the analysis and are weighted corresponding to the material and equipment distribution associated with the typical construction project. The building cost index is compared to other national building cost indexes.

21339 **(LBL—14390) Source, origin, and propagation of quenches measured in superconducting dipole magnets.** Caspi, S.; Hassenzahl, W.V. (Lawrence Berkeley Lab., CA (USA)). Nov 1982. Contract AC03-76SF00098. 6p. (CONF-821108—23). NTIS, PC A02/MF A01. Order Number DE83007065.

From Applied superconductivity conference; Knoxville, TN, USA (30 Nov 1982).

Transitions from the superconducting to normal state at 4.4 and 1.8 K in several model accelerator dipoles were recorded by a fast data-acquisition system. The resistive voltage rise in the conductor during the transitions is used to determine accurately the location of the quench source in the magnets and to estimate the axial and turn-to-turn quench velocities. The quench velocity, temperature evolution and energy deposition in the coil were calculated using the program QUENCH, and are in reasonable agreement with the data. In the two dipole magnets studied, the transitions almost always occurred in the regions of highest field. In one coil the high field region is in the straight section because the field in this region is enhanced by iron support rings. In the other magnet the high field region is at the end, in the innermost turn of the first layer. Some quenches were preceded by large voltage spikes that can be ascribed to conductor motion. Other quenches do not appear to be associated with any large energy release. Acoustic emission (AE) was monitored during the tests and AE bursts were observed simultaneous with the initial voltage spike. An increased AE signal continued as the quench progressed.

21340 **(LBL—14445) Ramp rate sensitivities of several superconducting dipole magnets operated in He I and superfluid He II.** Caspi, S.; Gilbert, W.S.; Rechen, J.B. (Lawrence Berkeley Lab., CA (USA)). Nov 1982. Contract AC03-76SF00098. 6p. (CONF-821108—24). NTIS, PC A02/MF A01. Order Number DE83007021.

From Applied superconductivity conference; Knoxville, TN, USA (30 Nov 1982).

The quench current of a superconducting dipole magnet decreases from its slow-ramp value as the current ramp-rate is increased, due to heat buildup in the coil winding. This ramp-rate dependence has been measured for several superconducting dipoles in both normal He I and in superfluid He II. The heat generated by charging fields has been measured for severall magnets in He II, where particularly sensitive and accurate measurements can be made of any heat input to the essentially isothermal helium bath by its temperature rise. Previously measured values of heat transfer are applied to the data from one magnet to explain its observed behavior. The conclusion is drawn that at a given cycle rate, a superfluid He II-cooled superconducting accelerator can operate closer to the short-sample limit of the magnet's superconductor than can a corresponding He I-cooled machine.

21341 **(LBL—15372) Four-layer, two-inch bore, superconducting dipole magnet.** Hassenzahl, W.V.; Peters, C.; Gilbert, W.; Taylor, C.; Meuser, R. (Lawrence Berkeley Lab., CA (USA)). Nov 1982. Contract AC03-76SF00098. 7p. (CONF-821108—21). NTIS, PC A02/MF A01. Order Number DE83006954.

From Applied superconductivity conference; Knoxville, TN, USA (30 Nov 1982).

Superconductors provide the accelerator designer with a unique opportunity to construct machines that can achieve high particle energies and yet have low operating costs. This paper describes the design, fabrication and testing of a 4 layer, 50 mm bore superconducting dipole magnet, D-9A. The magnet reached short sample, 5.8 T at 4.4 K and 8.0 T and 1.8 K, with little training, and exhibited low losses and low ramp rate sensitivity.

21342 **(N—82-24469) Helium 2 cooling systems for long term missions in space: phase separation and hybrid cooling systems.** Klipping, G.; Klipping, I.; Schmidtchen. (Max-Planck-Gesellschaft zur Foerderung der Wissenschaften e.V., Berlin (Germany, F.R.). Fritz-Haber-Institut). Sep 1980. 50p. (In German). NTIS, PC A03/MF A01.

Report will also be announced as translation (ESA-TT-721) REFS.

The suitability of helium 2 (superfluid helium) phase separation and hybrid cooling systems for astronomical and aeronomical observations in space, e.g., infrared radiation, was studied. The different aspects of phase separation under conditions of weightlessness are treated and the active phase separator for a liquid helium cooled infrared observatory for Spacelab, German Infrared Laboratory (GIRL) is described. For long-term (more than one year) applications, a hybrid cooling system is required in which refrigerants boiling at higher temperatures are employed. The suitability of hydrogen and neon were investigated as well as that of a secondary solid refrigerant. Analysis indicates that such a hybrid cooling system, using solid neon, can be realized and has substantial advantages compared with a one-stage He 2 cooling system. (ESA)

21343 (NASA-CP—2122-PT-1) **Cryogenic technology, part 1.** (National Aeronautics and Space Administration, Hampton, VA (USA). Langley Research Center). Mar 1980. 273p. (L—13547). NTIS, PC A12/MF A01.

Conf. held at Hampton, Va., 27-29 Nov. 1979.

Different engineering problems associated with the design of mechanisms and systems to operate in a cryogenic environment are discussed. The focal point for the entire engineering effort was the design of the National Transonic Facility, which is a closed-circuit cryogenic wind tunnel. The papers covered a variety of mechanical, structural, and systems design subjects including thermal structures insulation systems, noise, seals, and materials.

21344 (NASA-CP—2122-PT-2) **Cryogenic technology, part 2.** (National Aeronautics and Space Administration, Hampton, VA (USA). Langley Research Center). Mar 1980. 159p. (L—13547). NTIS, PC A08/MF A01.

Conf. held at Hampton, Va., 27-29 Nov. 1979.

Proceedings of a conference on the cryogenic technology developed in support of a transonic wind tunnel are given. Papers address tunnel instrumentation and mode/sting technology.

21345 (NASA-CR—166722) **A preliminary design of the cryogenic system for the Cooled Limb Scanning Interferometer Radiometer (CLIR), phase 3. Final report.** Naes, L.G.; Parmley, R.T.; Nast, T.C. (Lockheed Missiles and Space Co., Palo Alto, CA (USA)). 1981. 82p. NTIS, PC A05/MF A01.

The performance of the cryogenic cooling system for the limb scanning interferometer radiometer (CLIR) instrument which was proposed to be flown on the Atmospheric-Magnetospheric Physics Satellite is discussed. The use of both normal boiling point liquid helium or hydrogen is considered. In determining the performance of the two cooler configurations, a nominal aperture heat of 4.33 watts was used, which is half the value used in previous studies. The reduced aperture heat load reflects that benefits achieved by using an improved baffle configuration. The ground support equipment necessary to support the CLIR cooler in either the liquid helium or solid hydrogen mode was determined. A parts list was generated for both the ground support equipment and the cooler system.

21346 (NASA-CR—168769) **Optically pumped submillimeter-waves and applications. Final report.** Dutta, J.M.; Jones, C.R. (North Carolina Central Univ., Durham (USA)). 1982. 14p. NTIS, PC A02/MF A01.

Rapid development of optically pumped lasers has shown the potential to be used as a source for a high resolution spectrometer. In this connection, a compact, stable FIR laser was designed, fabricated, and assembled, integrating both the pump laser and the FIR cavity in the same mechanical structure for its improved (both thermal and mechanical) stability and mobility. Performance of the mixer structure which was designed and constructed for the evaluation of the Schottky diodes was found to be satisfactory. The feasibility of generating tunable sideband for molecular spectroscopy studies was demonstrated.

21347 (NP—3901016) **Application of the procedure of dynamic relaxation for the calculation of an elastically embedded spherical shell.** Thiede, R. (Hannover Univ. (Germany, F.R.). Inst. fuer Statik). Dec 1980. 58p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83901016.

In the treatment of elastically embedded shells by finite element methods, a calculation of the rigid body deformations before each iteration essentially improves the convergence of the method. This is also the case when calculating the fictitious densities instead of the real material densities. Some evidence has been obtained for the choice of a damping factor by empirical evaluation of several model calculations.

21348 (PB—82-215450) **A study of design principles for refrigerators for low-power cryoelectronic devices.** Zimmerman, J.E.; Sullivan, D.B. (National Bureau of Standards, Washington, DC (USA). Center for Building Technology). Jan 1982. 116p. (NBS-TN—1049). NTIS, PC A06/MF A01.

This report summarizes a five-year effort at NBS which has been directed toward the development of low-power cryocoolers suited to the support of super-conducting instruments. The report deals with a variety of aspects of construction and operation of refrigerators as well as with a model which allows one to optimize the design for minimum drive power. The publications generated by the program are included as an appendix.

21349 (PB—83-103523) **Signal coupling to thin-film SQUIDS and magnetometry without flux transformers.** Penttinen, A. (Helsinki Univ. of Technology, Espoo (Finland). Dept. of Technical Physics). Dec 1981. 48p. NTIS, PC A03/MF A01.

The efficiencies of several coupling geometries to a thin-film RF-SQUID are analyzed. The schemes of coupling are a single layer solenoid coupling, coupling by a solenoid with a superconducting core, and coupling by a thin-film transformer. Further some light is thrown upon the operation of a SQUID magnetometer, based on shielding currents around a superconducting body. Finally, the inductance formulae for superconducting structures appearing frequently in SQUID devices, are given in the Appendix.

21350 (PNL—4118) **Existing experimental criticality data applicable to nuclear-fuel-transportation systems.** Bierman, S.R. (Pacific Northwest Lab., Richland, WA (USA)). Feb 1983. Contract AC06-76RL01830. 27p. (TTC—0295). NTIS, PC A03/MF A01. Order Number DE83008163.

Analytical techniques are generally relied upon in making criticality evaluations involving nuclear material outside reactors. For these evaluations to be accepted the calculations must be validated by comparison with experimental data for a known set of conditions having physical and neutronic characteristics similar to those conditions being evaluated analytically. The purpose of this report is to identify those existing experimental data that are suitable for use in verifying criticality calculations on nuclear fuel transportation systems. In addition, near term needs for additional data in this area are identified. Of the considerable amount of criticality data currently existing, that are applicable to non-reactor systems, those particularly suitable for use in support of nuclear material transportation systems have been identified and catalogued into the following groups: (1) critical assemblies of fuel rods in water; (2) critical assemblies of fuel rods in water containing soluble neutron absorbers; (3) critical assemblies containing solid neutron absorber; (4) critical assemblies of fuel rods in water with heavy metal reflectors; and (5) critical assemblies of fuel rods in water with irregular features. A listing of the current near term needs for additional data in each of the groups has been developed for future use in planning criticality research in support of nuclear fuel transportation systems. The criticality experiments needed to provide these data are briefly described and identified according to priority and relative cost of performing the experiments.

21351 (SAND—81-2029) **Laboratory technique for simulation of projectile penetration into geological targets.** Setchell, R.E.; Guzman, J.A. (Sandia National Labs., Albuquerque, NM (USA)). Jan 1983. Contract AC04-76DP00789. 22p. NTIS, PC A02/MF A01. Order Number DE83006390.

A new approach to laboratory-scale experiments on high-velocity penetration of projectiles into geological materials is demonstrated. This method utilizes a commercial accelerometer mounted within a small penetrator model that impacts a sample of target material. As in previous laboratory-scale experiments at high velocities, a compressed-gas gun is used in a reverse-ballistics configuration to accelerate a geological sample into an initially stationary penetrator. The present approach provides an acceleration history during the penetration, rather than displacement or velocity data as in these previous studies. Two experiments were conducted at each of two impact velocities using a conical-nosed penetrator and a simulated soft-sandstone target. The recorded accelerometer signals show high-frequency transducer resonances superimposed on the response expected for rigid-body acceleration. Direct numerical techniques are used to extract the rigid-body acceleration history. In addition to demonstrating the effectiveness of this approach, the present results provide useful information on how peak penetrator forces vary with impact velocity during conical-nosed penetration into the simulated sandstone.

21352 **(SAND—82-0053) Thermal analysis of a linear infrared lamp.** Nakos, J.T. (Sandia National Labs., Albuquerque, NM (USA)). Jan 1982. Contract AC04-76DP00789. 94p. NTIS, PC A05. Order Number DE82011679.

A theoretical and experimental analysis of an infrared lamp is presented based on radiant heat transfer theory. The analysis is performed on a specific type of linear lamp which has a coiled tungsten filament surrounded by a fused quartz envelope. The purpose of the study was to model the lamp thermally, not electrically, to arrive at a better understanding of the operation of the lamp.

21353 **(SAND—82-0809) Computing minimum cost fire protection.** Hulme, B.L.; Shiver, A.W.; Slater, P.J. (Sandia National Labs., Albuquerque, NM (USA); Alabama Univ., Huntsville (USA)). Jun 1982. Contract AC04-76DP00789. 51p. NTIS, PC A04/MF A01. Order Number DE83007407.

Presented here is a computational method of protecting a facility from accidental fire. If certain sets of equipment are known to be critical, in the sense that destruction by fire of any of these sets can lead to disastrous consequences, then this method can be used to identify specific areas and barriers for increased fire protection with the result that no single-source fire can spread to and destroy any of the critical sets of equipment. Moreover, these areas and barriers may be chosen so as to minimize the total cost of fire protection. As an alternative, the method can also be used to maximize the probability of fire protection.

21354 **(UCID—19323-82-4) Mechanical engineering research. Quarterly progress report, October-December 1982.** Goldberg, A. (comp.). (Lawrence Livermore National Lab., CA (USA)). 31 Jan 1983. Contract W-7405-ENG-48. 55p. NTIS, PC A04/MF A01. Order Number DE83002795.

The Mechanical Engineering Research (MER) Program is supported by the Nuclear Weapons Program. MER currently is funding eight projects representing four thrust areas. These are: in surface measurements and characterization, an acoustic microscope for surface characterization and automatic spherical surface characterization; in fabrication technology, a diamond turning machine No. 3 and determination of fusion zone energy transport during arc welding; in material characterization and behavior, characterization of martensitic transformations using acoustic emission; temperature and rate effects on elastic-plastic fracture behavior; and in computer-aided engineering; solid geometric modeling and multivariable systems analysis and design. A compilation of the first quarterly FY-83 progress reports for the above projects are presented here. (LCL)

21355 **(UCID—19728) Time-tying of EMP test data.** McGevna, V.G. (Lawrence Livermore National Lab., CA (USA)). 16 Feb 1983. Contract W-7405-ENG-48. 41p. NTIS, PC A03/MF A01. Order Number DE83008311.

An algorithm for automatic time-tying of EMP data sets has been developed. The algorithm reflects the nature of the EMP data as well as the idiosyncracies of the data acquisition system. A number of performance measures which can be generated during time-tying have been identified. These can provide the capability of on-line monitoring of the data acquisition system. Computer monitoring can reduce the need for manual review of data and improve the quality of the data obtained during the course of a test.

21356 **(UCRL—53045) Protecting against failure by brittle fracture in ferritic-steel shipping containers greater than four-in. thick.** Schwartz, M.W. (Lawrence Livermore National Lab., CA (USA)). Dec 1982. Contract W-7405-ENG-48. 48p. NTIS, PC A03/MF A01. Order Number DE83007462.

This report presents methods for protecting against brittle fracture spent-fuel shipping containers made from ferritic-steel forgings greater than four in. thick. Both fracture arrest and fracture initiation criteria were examined as bases for establishing requirements for the design and selection of materials for shipping containers. This report also includes a discussion of the brittle-fracture sensitivity of the containers to various processes used in container fabrication. 19 figures, 3 tables.

21357 **(UCRL—88340) Acceptance testing of two 24" lathes.** Affeldt, D. (Lawrence Livermore National Lab., CA (USA)). 9 Nov 1982. Contract W-7405-ENG-48. 7p. (CONF-8210118—1). NTIS, PC A02/MF A01. Order Number DE83006581.

From Interagency mechanical operations group meeting; Albuquerque, NM, USA (27 Oct 1982).

Tests performed to assure that two 24" lathes with about 60" center distance met specifications for accuracies in straightness, parallelism, positioning and spindle runout are described. (LCL)

21358 **Thermoelectric refrigerator having improved temperature stabilization means.** Falco, C.M. (to Dept. of Energy). US Patent 4,362,023. 7 Dec 1982. Filed date 29 Jul 1981. vp.

PAT-APPL-287965.

A control system for thermoelectric refrigerators is disclosed. The thermoelectric refrigerator includes at least one thermoelectric element that undergoes a first order change at a predetermined critical temperature. The element functions as a thermoelectric refrigerator element above the critical temperature, but discontinuously ceases to function as a thermoelectric refrigerator element below the critical temperature. One example of such an arrangement includes thermoelectric refrigerator elements which are superconductors. The transition temperature of one of the superconductor elements is selected as the temperature control point of the refrigerator. When the refrigerator attempts to cool below the point, the metals become superconductors losing their ability to perform as a thermoelectric refrigerator. An extremely accurate, first-order control is realized.

21359 **Radioactive hot cell access hole decontamination machine.** Simpson, W.E. (to Dept. of Energy). US Patent 4,343,059. 10 Aug 1982. Filed date 6 Apr 1981. vp.

PAT-APPL-251643.

Radioactive hot cell access hole decontamination machine is described. A mobile housing has an opening large enough to encircle the access hole and has a shielding door, with a door opening and closing mechanism, for uncovering and covering the opening. The housing contains a shaft which has an apparatus for rotating the shaft and a device for independently translating the shaft from the housing through the opening and access hole into the hot cell chamber. A properly sized cylindrical pig containing wire brushes and cloth or other disks, with an arrangement for releasably attaching it to the end of the shaft, circumferentially cleans the access hole wall of radioactive contamination and thereafter detaches from the shaft to fall into the hot cell chamber.

21360 **Plans and equipment for criticality measurements on plutonium-uranium nitrate solutions.** Lloyd, R.C.; Clayton, E.D.; Durst, B.M. (Battelle-Pacific Northwest Laboratory, P.O. Box 999, Richland, WA 99352). *Transactions of the American Nuclear Society;* 41: 350-351(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

21361 **Nuclear criticality of heterogeneous mixed-oxide systems.** Libby, R.A.; Clayton, E.D. (Battelle-Pacific Northwest Laboratory, P.O. Box 999, Richland, WA 99352). *Transactions of the American Nuclear Society;* 41: 354(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

21362 Fault tree methods in the criticality assessment of the transuranic waste treatment facility. Worle, H.A. (EG & G Idaho Inc., P.O. Box 1625, Idaho Falls, ID 83415). *Transactions of the American Nuclear Society;* **41**: 333-334(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

21363 Analysis of an oil-uranium deposit in gaseous diffusion equipment. Yates, K.R.; Denning, R.S.; Jung, R.G. (Battelle Columbus Laboratories, 505 King Avenue, Columbus, OH 43201). *Transactions of the American Nuclear Society;* **41**: 335-336(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

21364 Close-packed critical experiments analysis. Maceda, E.L.; Welfare, F.G. (Babcock & Wilcox Company, P.O. Box 1260, Lynchburg, VA 24505). *Transactions of the American Nuclear Society;* **41**: 336-337(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

21365 Criticality safety of the ten-well insert for the pot dissolver. Forstner, J.L. (E. I. du Pont de Nemours & Company, Savannah River Plant, Aiken, SC 29808). *Transactions of the American Nuclear Society;* **41**: 342-343(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

21366 Criticality analysis of the ICPP zirconium dissolver using MONK. Fergus, I.E.; Layman, B.J. (Exxon Nuclear Idaho Co., Inc., P.O. Box 2800, Idaho Falls, ID 83401). *Transactions of the American Nuclear Society;* **41**: 343-345(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

21367 Aerosol generator for monodisperse Ag- and NaCl-aerosols in the particle size range between 2 nm and 300 nm. Scheibel, H.G.; Porstendoerfer, J.; Becker, K.H.; Hussin, A. pp 319 of Aerosols in science medicine and technology. Stoeber, W.; Hochrainer, D. (eds.). Bad Soden, Germany; Gesellschaft fuer Aerosolforschung e.V. (1981).

From Conference on aerosols in science and technology - aerosols in and from in and from industrial processes; Duisburg, F.R. Germany (23 Sep 1981).

21368 Development of techniques for the preparation of monodisperse solid ferric oxide particles using the May spinning-top aerosol generator. Mitchell, J.P. pp vp of Aerosols in science, medicine and technology. Stoeber, W.; Hochrainer, D. (eds.). Bad Soden, Germany; Gesellschaft fuer Aerosolforschung e.V. (1981).

From Conference on aerosols in science and technology - aerosols in and from in and from industrial processes; Duisburg, F.R. Germany (23 Sep 1981).

Modifications have been made to the May spinning-top aerosol generator in order to produce satellite free, monodisperse ferric oxide particles in the size range 1 - 10 μm. The problems encountered during the development work are described in detail and the factors which have been found to influence the reliability of this equipment are emphasised.

21369 Commissioning of a commercially available vibrating office aerosol generator. Boyd, J.V. pp vp of Aerosols in science, medicine and technology. Stoeber, W.; Hochrainer, D. (eds.). Bad Soden, Germany; Gesellschaft fuer Aerosolforschung e.V. (1981).

From Conference on aerosols in science and technology - aerosols in and from in and from industrial processes; Duisburg, F.R. Germany (23 Sep 1981).

Standard monodisperse aerosols are required for the calibration of aerosol particle size analysers. A commercially available vibrating orifice aerosol generator has been commissioned to produce liquid and solid aerosols in the particle size range 2-30 μm. Various problems have been experienced during the operation of this equipment, particularly regarding the reliable generation of solid aerosols. The performance of the generator is reviewed in terms of the liquid feed, the orifice-jet requirements, the solvent evaporation and the solid aerosol drying characteristics.

21370 Real-time aerodynamic particle size analyzer. Agarwal, J.K.; Remiarz, R.J.; Quant, F.R.; Sem, G.J. pp vp of Aerosols in science, medicine and technology. Stoeber, W.; Hochrainer, D. Bad Soden, Germany; Gesellschaft fuer Aerosolforschung e.V. (1981).

From Conference on aerosols in science and technology - aerosols in and from in and from industrial processes; Duisburg, F.R. Germany (23 Sep 1981).

This paper describes a new commercial real-time aerodynamic particle size analyzer. In this instrument, the particles first acquire a velocity which is related to their aerodynamic diameter. The velocity of each particle is then measured by using a laser velocimeter.

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REFER ALSO TO CITATION(S) 21560, 22768

21371 (AD-A—115168/7) Energetics and radiative properties of excimer lasers. Final report. Michels, H.H.; Hobbs, R.H. (United Technologies Research Center, East Hartford, CT (USA)). Jan 1981. 172p. (UTRC—924270). NTIS, PC A08/MF A01.

This research program was concerned with a theoretical study of the energetics of the noble gas halides and noble gas dimer and trimer molecular ions. The electronic structure, potential energy curves, and radiative transition probabilities of excimer systems such as ArF and Ar^3F have been examined using quantum mechanical methods. A systematic study of the electronic structure in the noble gas dimer ion sequence, $Ne^2(+)$, $Ar^2(+)$, $Kr^2(+)$ and $Xe^2(+)$, was carried out. This study included detailed calculations of the pertinent potential energy curves and an analysis of the calculated spectroscopic properties of the bound states of these ions. Finally, calculations were carried out on the electronic structure and photoabsorption characteristics of the noble gas trimer ion $Ar^3(+)$. This study included detailed calculations of the potential energy surfaces for $Ar^3(+)$, an analysis of the spectroscopic properties of the ground state of this ion and prediction of the strong absorption bands.

21372 (AD-A—115246/1) Theory of pulse propagation and coherence in free electron lasers. Annual scientific report. Colson, W.B. (California Univ., Santa Barbara (USA). Quantum Inst.). 1982. 10p. NTIS, PC A02/MF A01.

Pulse propagation in several free electron laser designs is examined along with mode instabilities, oscillator evolution, spontaneous emission, transverse wavefront propagation, and Coulomb forces. The designs explored include the simple undulator, the tapered undulator, the optical klystron, and the transverse gradient gain-expansion magnet.

21373 (AD-A—115576/1) Methods for an alternating beam ring laser. Master's thesis. Drake, M.L. (Air Force Inst. of Tech., Wright-Patterson AFB, OH (USA). School of Engineering). Dec 1981. 75p. NTIS, PC A04/MF A01.

The purpose of this research is to investigate the feasibility of three methods of alternating beams in ring lasers. The first method is the use of a Faraday cell and a half-wave plate inside the laser cavity to rotate the plane of polarization of one of the counter-rotating beams so that lasing in that direction is not supported. The second method, and the one investigated experimentally, is the use of mirrors and a mechanical chopper external to the laser cavity to halt lasing by means of mode competition. The third and final method explored is the replacement of the mechanical chopper with an electro-optical shutter.

21374 (AD-A—115618/1) Electrostatic technology for control of dust and hydrocarbon vapors in high power laser systems. Final report. Hoenig, S.A. (Arizona Univ., Tucson (USA)). Apr 1982. 62p. NTIS, PC A04/MF A01.

The application of electrostatic techniques has been investigated as a repulsion system to keep dust off mirrors that might be used in high-power laser systems. A demonstration unit for a 30 cm mirror was built and shipped to Kirtland Air Force Base as part of the program. Other efforts investigated the development of technology that might be used to keep dust and contaminants off large mirrors in an orbiting space platform. If there is dust deposition it may be practical to clean the reflecting surfaces with a dry wipe-off system without damaging delicate coatings or metal films.

21375 (AD-A—115739/5) Electron drift in a linear magnetic wiggler with an axial guide field. Memorandum report. Pasour, J.A.; Mako, F.; Roberson, C.W. (Naval Research Lab., Washington, DC (USA)). 18 Jun 1982. 24p. NTIS, PC A02/MF A01.

Electron trajectories through a linear magnetic wiggler in an axial guide field are calculated numerically. Off-axis electrons are shown to drift in a direction perpendicular to the wiggler field because of the wiggler gradient. Effects of self fields and initial conditions are analyzed, and the results are compared to those obtained with a helical wiggler. An empirical analytic expression for the linear wiggler drift is presented, and means of stabilizing the drift are discussed.

21376 (AD-A—115936/7) The UCSB free electron laser experimental program. Elias, L.R. (California Univ., Santa Barbara (USA). Quantum Inst.). 28 Oct 1981. 11p. NTIS, PC A02/MF A01.

The University of California at Santa Barbara (UCSB) free electron laser (FEL) program was initiated in January of 1980 at the Quantum Institute to study the operation of electrostatic accelerator free electron lasers. A detailed discussion of the operation of these devices can be found elsewhere in this book under the title 'Electrostatic Accelerator Free Electron Lasers'. The main goal in this paper is threefold: (1) to present a summary of the UCSB experimental FEL program to date, (2) to discuss future FEL device development objectives, and (3) to talk briefly about the future of applied research at UCSB. There is presently in existence a large number of high energy electron accelerator machines that can be readily used as sources of electron beams suitable to demonstrate the basic operation of free electron lasers. This is the case, for example, with the super-conducting electron accelerator at Stanford University where the first operation of the free electron laser was demonstrated in 1975, and where the potential operating characteristics of FEL's such as high power, high efficiency and broadband continuous tunability were clearly delineated. To realize all of the above predicted operating capabilities of free electron lasers it is, however, necessary to develop suitable electron beam sources.

21377 (AD-A—115937/5) Design of the UCSB FEL electron beam system. Elias, L.R.; Ramian, G. (California Univ., Santa Barbara (USA). Quantum Inst.). 28 Oct 1981. 30p. NTIS, PC A03/MF A01.

The UCSB FEL experimental program was initiated January 15, 1980 at the Quantum Institute of the University of California at Santa Barbara. It's principal objective is to demonstrate the operation of electrostatic-accelerator free-electron lasers in (1) the FIR-submillimeter region at high average power and high overall efficiency using a single stage FEL; and (2) the visible-IR region with modest power and modest overall efficiency using a two-stage FEL. An important feature of the UCSB FEL is the recovery of the spent electron beam. Both (1) the average laser power and (2) the overall efficiency of the FEL increase with increased electron beam collection efficiency. Optimum laser performance can be achieved with this device provided only a small fraction of the total electric charge stored in the beam is lost while transporting it through the system. Realization of this low charge loss condition can be achieved only if a very high quality electron beam can be produced and maintained throughout the electron accelerator and transport system.

21378 (AD-A—115938/3) Three dimensional radiation fields in free electron lasers using Lienard-Wiechert fields. Elias, L.R.; Gallardo, J. (California Univ., Santa Barbara (USA). Quantum Inst.). 28 Oct 1981. 24p. NTIS, PC A02/MF A01.

In a free electron laser a relativistic electron beam is bunched under the action of the ponderomotive potential and is forced to radiate in close phase with the input wave. Until recently, most theories of the FEL have dealt solely with electron beams of infinite transverse dimension radiating only one-dimensional E.M. waves (plane waves). Although these theories describe accurately the dynamics of the electrons during the FEL interaction process, neither the three dimensional nature of the radiated fields nor its non-monochromatic features can be properly studied by them. As a result of this, very important practical issues such as the gain per gaussian-spherical optical mode in a free electron laser have not been well addressed, except through a one dimensional field model in which a filling factor describes crudely the coupling of the FEL induced field to the input field.

21379 (AD-A—115942/5) Aspects of high-energy laser theory. Final report. Hillery, M.; Scully, M.O. (New Mexico Univ., Albuquerque (USA)). 31 Oct 1981. 44p. NTIS, PC A03/MF A01.

The research which was conducted under this contract fell mainly into three categories: gain switching, injection locking, and photon statistics. In addition, some work in the foundations of radiative transport theory and spectroscopy was also performed. The use of a metastable state as the upper laser level was shown to offer the possibility of obtaining large inversions and thereby storing large amounts of energy in the lasing medium. The problem associated with this is that the linear gain which one obtains from the transition from this level to the lower laser level is quite small. The possibility of 'dumping' the energy stored in the metastable was investigated.

21380 (AD-A—115944/1) Research on the flow phenomena related to high power laser. Final technical report 1 Nov 78-31 Dec 81. Christiansen, W.H.; Russell, D.A.; Hertzberg, A. (Washington Univ., Seattle (USA)). 31 Mar 1982. 25p. NTIS, PC A02/MF A01.

The fundamental mechanisms of the interaction of electrical discharges of the glow type and the fluid mechanics normally found in electric discharge lasers have been studied in an effort to improve their performance capability. Basic information on these devices was obtained via small-scale experiments at the University of Washington. An alternative method of phase compensation for laser beams using the refractive properties of gas jets was also investigated. The amount of beam degradation produced by turbulent shear layers in the jets was studied also. The experimental investigation of this beam degradation mechanism constitutes much of the effort in the project. Theoretical calculations detailing the effects of mixing of dissimilar gases at low Mach number have been carried out. High-power laser mixing flows have been studied by numerical, analytical, and experimental techniques. The models for wave decay in supersonic cavity flows have been extended, optical sensitivities calculated, and experiments conducted using a laser interferometer. Calculated thermodynamic parameter history through decaying wave systems has been used with simple HF reaction models to study strongly-coupled reaction shocks. A systematic study of the sensitivity of HF laser performance to fluid process assumptions has been carried out, with emphasis on power extraction measurements from a versatile shock/Ludwieg tube laboratory laser.

21381 (AD-A—119907/4) Final report of work in support of the Nrl Fel program. Final report 14 Mar-15 Sep 82. (KM Sciences, Arlington, VA (USA)). 15 Sep 1982. 11p. NTIS, PC A02/MF A01.

The Naval Research Lab. (NRL) Free Electron Laser (FEL) program proposed to use the NRL electron linear accelerator (LINAC) as a source of electrons for its studies. The FEL experiment will place very exacting demands on the parameters of the electron beam from the LINAC. Therefore a careful study of the present operation of the LINAC was necessary in order to determine exactly where and how modifications and improvements could be made to best meet the needs of the FEL program. To do this the system was considered in the following segments: Electron injection electronics, Electron beam injection hardware, Accelerating structure, First 90 degree bend and energy definition, Transport from room 105a to room 103a, Second 90 degree deflection, Beam dump system.

21382 (AD-A—120098/9) Mercury bromide laser discharge life studies. Final report 1 May 81-31 Jan 82. Liu, C.S.; Liberman, I. (Westinghouse Electric Corp., Pittsburgh, PA (USA). Research and Development Center). 3 Aug 1982. 15p. NTIS, PC A02/MF A01.

This report summarizes research work performed at the Westinghouse R/D Center under ONR Contract No. N00014-81-C-0485 for the period between May 1, 1981 and January 31, 1982. The major effort was to perform experimental lifetime studies of the HgBr laser system, and to verify noble metal electrodes for long life operation in HgBr laser discharges. In this report, the results of experimental life tests of gold and platinum electrodes for HgBr lasers are presented. The life expectancy of such electrodes is over 10 to the 8th power shots or 300 hours at 100 pulses per second. The possibility of extending its life to 10 to the 10th power shots is discussed.

21383 (BMFT-FB-T—81-043) Laser tool: pulsed solid state laser for welding and ablation of material. Final report, September 1979. Seiler, P. (Haas (Carl) G.m.b.H. und Co., Schramberg (Germnay, F.R.)). Feb 1981. 20p. (In several languages). NTIS, PC A02/MF A01.

Bundesministerium fuer Forschung und Technologie Sponsored by Bundesministerium fuer Forschung und Technologie.

A system of lasers, focusing and viewing optics, control and power electronics, coolers and mechanical components, was designed. The incorporated Nd-glass pulsed lasers have pulse energies up to 100 Wsec and average output powers up to 100 W. The machines are used in precision and electrical engineering, mainly combined with industrial handling. Being ideally suited for automation, this method has a wide range of application in the field of spot and seam welding of small parts and is widely used to make electric contacts. (ESA)

21384 (BMFT-FB-T—81-095) Optical pumped neodymium miniature laser transmitter. Final report, October 1978. Geckeler, S.; Kruehler, W.; Mahlein, H.F.; Plaettner, R.; Schiffner, G.; Vite, L.; Winzer, G. (Siemens A.G., Muenchen (Germany, F.R.)). Jul 1981. 173p. (In several languages). NTIS, PC A08/MF A01.

Bundesministerium fuer Forschung und Technologie REFS Sponsored by Bundesministerium fuer Forschung und Technologie.

The preparation and the properties of the most important stoichiometric Nd laser materials and miniature lasers made from them are considered as well as calculations for pumping these lasers with LEDs and for coupling them to the modulator. Both optical communication systems and the rival merits of neodym solid-state lasers and semiconductor lasers are considered. The following results are of particular interest: miniature lasers for 1.06 micrometer and in some cases for 1.32 micrometer fabricated from NdP^5O^{14}, $NdAl^3(BO^3)^4$ and $LiNd(PO^3)^4$ with mirrors directly applied to their endfaces allowing CW operation at room temperature. The LNP laser with 1 mW threshold, 6% differential efficiency and a threshold pump power density of 4 kW/cu cm offers the best performance. The electrooptical coefficient expected for $NdAl^3(BO^3)^4$ on the basis of lattice symmetry was found to be 0.6 x 10 to the -12 power m/V. The Nd laser transmitter can be expected to cost considerably more than the future INGAP semiconductor laser transmitter.

21385 (BMFT-FB-T—81-151) Laser diode. Final report, May 1980. Mettler, K.; Zschauer, K.H.; Wolf, H.D.; Endler, W. (Siemens A.G., Muenchen (Germany, F.R.)). Sep 1981. 78p. (In several languages). NTIS, PC A05/MF A01.

Stable, profitable, narrow proton and oxide stripe lasers were fabricated from multiple layers of (Ga,Al)As by the dimensioning of the structure based on a two dimensional mathematical model. They operated satisfactorily in the experimental system at data rates of 560 Mbit/s. Accelerated degradation tests gave extrapolated life times for room temperature operation in excess of 100,000 hours. Furthermore, three index guided laser structures (BH, CSP and RIG) were tested (In,Ga)(As,P)/InP multilayers were fabricated and tested by using broad mesa lasers.

21386 (CONF-820336—9) Generation of narrow-band tunable radiation in the 1200-A spectral region. Tomkins, F.S.; Mahon, R. (Argonne National Lab., IL (USA); Maryland Univ., College Park (USA)). 1982. Contract W-31-109-ENG-38. 6p. NTIS, PC A02/MF A01. Order Number DE83007621.

From Optical Society of America topical meeting on laser techniques for extreme ultraviolet spectroscopy; Boulder, CO, USA (8 Mar 1982).

Investigation of frequency up-conversion in Hg vapor has been extended further into the vuv, producing continuously tunable narrow-bandwidth radiation from 1220 A to 1174 A.

21387 (DOE/ER/10979—2) Nonlinear optics with broadband lasers. Progress report, July 15, 1982-July 14, 1983. Raymer, M.G. (Rochester Univ., NY (USA). Inst. of Optics). Mar 1983. Contract AC02-81ER10979. 42p. NTIS, PC A03/MF A01. Order Number DE83008369.

Experiments directed at understanding the fundamental nature of broad-band laser radiation and the consequences of using such radiation in non-linear optics are reported. Unexpected, exciting results were found in our measurements of intensity fluctuations in a broad-band cw dye laser, in which a new type of laser instability was observed. Its properties led us to tentatively identify the instability as a phase transition in a nonlinear system, a topic of great current interest in statistical mechanics and physics in general. Improvements have been made in our methods for making intensity autocorrelation measurements of pulsed dye lasers, and interesting properties of such lasers have been discovered. A system based on a high resolution detector array has been designed and constructed for the purpose of making single-shot measurements of pulsed laser spectra and of field cross-correlations in Raman scattering. The single-shot laser spectra are being observed with a novel Fizeau interferometer which we designed and constructed. The justification of our design for the proposed field cross-correlator has been further strengthened by a detailed theoretical analysis of this new measurement technique. Also, progress has been made on the theory of stimulated Raman scattering of broad-band, chaotic laser radiation.

21388 (LA-UR—83-330) High-efficiency free-electron laser results. Boyer, K.; Brau, C.A.; Newnam, B.E.; Stein, W.E.; Warren, R.W.; Winston, J.G.; Young, L.M. (Los Alamos National Lab., NM (USA)). 1982. Contract W-7405-ENG-36. 10p. (CONF-820988—7). NTIS, PC A02/MF A01. Order Number DE83007545.

From Free electron laser conference; Bendor, France (26 Sep 1982).

Results obtained with a tapered-wiggler free-electron laser show deceleration of electrons by as much as 7%, and extraction of more than 3% of the total electron-beam energy as laser energy.

21389 (N—82-14389) KrF laser pumping by electron beam discharge. Bonnet, J.; Fournier, G.; Pigache, D. (Office National d'Etudes et de Recherches Aerospatiales (ONERA), 75 - Paris (France)). Sep 1981. 5p. NTIS, PC A05/MF A01.

In its La Rech. Aerospatiale, Bi-monthly Bull. No. 1981-2, Mar. - Apr. 1981 (ESA-TT-713) p 3-7 (SEE N82-14388 05-31) Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimensuel (Paris) No. 1981-2, Mar. - Apr. 1981 REFS.

The pumping of excimer lasers used in nuclear fusion and isotope separation is considered. Homogeneous ionization with an electron beam permitted discharge pumping of a KrF laser with a discharge-energy/beam-energy ratio 5. This high value is obtained to the detriment of an energy density and an efficiency which are about half the best values obtained under other conditions. This result does not modify a recent conclusion indicating that an electron beam controlled discharge has no significant advantage over a pure electron beam as regards pumping high energy KrF lasers at high repetition rate. (ESA)

21390 **(N—82-25097) Electronic beam steering of semiconductor injection lasers.** Katz, J. (Jet Propulsion Lab., Pasadena, CA (USA)). Apr 1982. 17p. NTIS, PC A09/MF A01.

In its The Telecommun. and Data Acquisition Rept. p 25-41 (SEE N82-25092 15-99) REFS.

A theoretical analysis of the problem of beam steering is presented. The required modifications of the dielectric constant profile of the laser structure were derived. A practical method for implementing the needed modifications is outlined.

21391 **(N—82-25098) Phase control and beam steering of semiconductor laser arrays.** Katz, J. (Jet Propulsion Lab., Pasadena, CA (USA)). Apr 1982. 8p. NTIS, PC A09/MF A01.

In its Telecommun. and Data Acquisition Rept. p 42-49 (SEE N82-25092 15-99) REFS.

The operational principles and a possible device configuration of one dimensional monolithically integrated semiconductor laser arrays are described. The output beam of the array can be electronically steered. Devices of the type can find applications in optical communication systems where the power levels needed are above the capability of a single laser device.

21392 **(N—8228617) A survey of some recent developments in laser Raman spectroscopy.** Jenden, C.M. (Materials Quality Assurance Directorate, London (England)). Oct 1981. 22p. Materials Quality Assurance Directorate, London, England.

Computer controlled Raman spectrometers, resonance Raman spectroscopy (RRS), time resolved Raman spectroscopy (TRS), the laser Raman microprobe (LRM) and coherent Raman spectroscopy (CRS) are discussed. The RRS works well with aqueous or solid substances, giving simple spectra with good resolution and detection. Fluorescence problems limit its usefulness. While TRS reduces fluorescent background scattering, and can give quantitative results from Raman spectra, it is complicated and expensive. The LRM maps each species in a heterogeneous sample, with molecular analysis of the whole sample area. Spectra can be observed in real time. Low laser power increases operating lifetime. Advantages of CRS include high conversion efficiency short spectral acquisition time and collimated output. It is not useful for media with large losses, e.g., opaque materials. Sensitivity is limited and spectra are disturbed by neighboring resonances.

21393 **(NASA-CASE-GSC—12565-1) Laser resonator.** Harper, L.W. (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center; International Laser Systems, Inc., Orlando, FL (USA)). Jun 1981. 18p. NTIS, PC A02/MF A01.

Sponsored by NASA.

An optical resonator cavity configuration uses a unitary mirror with an oppositely directed convex reflective surface and a concave reflective surface disposed into one fold which concertedly reverses both ends of a beam propagating from a laser rod disposed between two total internal reflection prisms. The prisms are rigidly positioned with perpendicularly crossed virtual rooflines by a compact optical bed. The rooflines of the internal reflection prisms are arranged perpendicularly to the axis of the laser beam and to the optical axis of the optical resonator components. NASA

21394 **(NASA-Case-LAR—12870-1) A solar pumped laser.** Lee, J.H. (Vanderbilt Univ.); Hohl, F. (National Aeronautics and Space Administration, Hampton, VA (USA). Langley Research Center). Dec 1981. 16p. NTIS, PC A02/MF A01.

A solar pumped laser in which the lasant is a gas is described. The gas will photodissociate and lase when subjected to sunrays. Sunrays are collected and directed onto the gas lasant to cause it to lase.

21395 **(NASA-CR—3520) Studies of single-mode injection lasers and of quaternary materials. Volume 1: Single-mode constricted double-heterojunction AlGaAs diode lasers. Final report, 4 Feb. 1980 - 15 May 1981.** Botez, D. (RCA Labs., Princeton, NJ (USA)). Apr 1982. 70p. NTIS, PC A04/MF A01.

Constricted double-heterojunction (CDH) lasers are presented as the class of single-mode nonplanar-substrate devices for which the lasing cavity is on the least resistive electrical path between the contact and the substrate. Various types of CDH structures are considered under three general topics: liquid-phase epitaxy over channeled substrates, lateral mode control, and current control in nonplanar-substrate devices. Ridge-guide CDH lasers have positive-index lateral-mode confinement and provide: single-mode CW operation to 7 mW/facet at room temperature and to 3 mW/facet at 150 C light-current characteristics with second-harmonic distortion as low as -57 dB below the fundamental level threshold-current temperature coefficients, as high as 375 C (pulsed) and 310 C (CW) constant external differential quantum efficiency to 100 C and lasing operation to 170 C CW and 280 C pulsed. Semileakyguide CDH lasers have an asymmetric leaky cavity for lateral-mode confinement and provide single-mode operation to 15 to 20 mW/facet CW and to 50 mW/facet at 50% duty cycle. Modulation characteristics and preliminary reliability data are discussed.

21396 **(NASA-CR—3521) Studies of single-mode injection lasers and of quaternary materials. Volume 2: Measurement of electro-optic effects in InGaAsP junction waveguides. Final report, 4 Feb. 1980 - 15 May 1981.** Hammer, J.M. (RCA Labs., Princeton, NJ (USA)). Apr 1982. 30p. NTIS, PC A03/MF A01.

Both the linear electro-optic (Pockel's) effect and electroabsorption (Franz-Keldysh effect) in waveguiding junctions of InGaAsP were measured. The electro-optic coefficient is found to be 0.1-0.14x10 to the -12 power m/V at lambda 1.54 - 1.65 micrometers. Possibly this is the first reported measurement of the electro-optic coefficient for InGaAsP. The value found for the electroabsorption is on the order of 7x10 to the -4 power cm to the -1 power/(V/cm) or approximately 100 cm/1 for fields of 200,000 V/cm at lambda 1.3 micrometers. All measurements were made on a quaternary film with a bandgap wavelength of 1.23 micrometers. Because of the rapid commercial introduction of quaternary lasers, LEDs, and detectors to take advantage of large optical fiber bandwidths and low losses in the 1.2- to 1.7- micrometer region, these measurements are significant in providing some of the basic physical constants needed to design modulators and switches capable of operating at microwave frequencies in this wavelength region.

21397 **(NASA-CR—165520) Free electron lasers for transmission of energy in space. final report.** Segall, S.B.; Hiddleston, H.R.; Catella, G.C. (KMS Fusion, Inc., Ann Arbor, MI (USA)). Oct 1981. 40p. NTIS, PC A03/MF A01.

A one-dimensional resonant-particle model of a free electron laser (FEL) is used to calculate laser gain and conversion efficiency of electron energy to photon energy. The optical beam profile for a resonant optical cavity is included in the model as an axial variation of laser intensity. The electron beam profile is matched to the optical beam profile and modeled as an axial variation of current density. Effective energy spread due to beam emittance is included. Accelerators appropriate for a space-based FEL oscillator are reviewed. Constraints on the concentric optical resonator and on systems required for space operation are described. An example is given of a space-based FEL that would produce 1.7 MW of average output power at 0.5 micrometer wavelength with over 50% conversion efficiency of electrical energy to laser energy. It would utilize a 10 m-long amplifier centered in a 200 m-long optical cavity. A 3-amp, 65 meV electrostatic accelerator would provide the electron beam and recover the beam after it passes through the amplifier. Three to five shuttle flights would be needed to place the laser in orbit.

21398 **(NASA-TM—83857) On the theory of gamma ray amplification through stimulated annihilation radiation (grasar).** Ramaty, R.; McKinley, J.M. (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center). Nov 1981. 36p. NTIS, PC A03/MF A01.

The theory of photon emission, absorption, and scattering in a relativistic plasma of positrons, electrons, and photon was studied. Expressions for the emissivities and absorption coefficients of pair annihilation, pair production, and Compton scattering are given and evaluated numerically. The conditions for negative absorption were investigated. In a system of photons and e(+) - e(-) pairs, an emission line at at approximately 0.43 MeV can be produced by grasar action provided that the pair chemical potential exceeds approximately 1 MeV. At a temperature of approximately 10 to the 9th power. This requires a pair density approximately 10 to the 30th power cm to the (-3) power a value much larger than the thermodynamic equilbrium pair density at this temperature. This emission line could account without a gravitational redshift for the observed lines at this energy from gamma ray bursts.

21399 **(NP—3900905) Detailed numerical code to analyze pumping linear cavities for solid-state lasers.** Roccella, M.; Tranquilli, A. (Comitato Nazionale per l'Energia Nucleare, Frascati (Italy). Lab. Nazionali di Frascati). Jan 1982. 15p. NTIS (US Sales Only), PC A02/MF A01.

A numerical code has been developed which allows the treatment of very complicated illumination geometry of the pumping cavity of solid-state lasers by means of linear flash lamps using Monte Carlo simulation. A compromise has been reached between the request of stochastic independence of the events and the need to keep calculation times reasonably low, by using a ray-tracing procedure based on graph technique. In this way, certain specific effects, such as refraction caused by cooling fluids and the scattering due to the finishing (polished or ground) of the surface, can be analyzed in greater detail than has previously been possible. Some examples are given in the text.

21400 **(NPL-MOM—54) Frequency dependence of a 633-nm He-Ne laser stabilized bby $^{127}I_2$, upon iodine pressure, modulation amplitude, and wall temperature.** Rowley, W.R.C. (National Physical Lab., Teddington (UK)). Sep 1981. 17p. NTIS, PC A02/MF A01.

The beat frequency of the frequency shifts of a 633 nm He-Ne laser (S) stabilized by intracavity saturated absorption to hyperfine components e and f of Iodine was measured. The reference laser (M) had an unheated iodine cell and an 18 C cold finger temperature. Half the observations were of S locked to iodine peak 2, M locked to f, and the rest with components interchanged. Linear frequency to pressure and frequency to modulation relations result, with the coefficients and extrapolated intercepts at zero pressure being dependent on the wall temperature. These relations are expressed in an empirical formula that enables the frequency correction to be calculated within + or - 5% for any deviation from standard operating parameters. (ESA)

21401 **(NPL-MOM—58) Development of optically pumped molecular dimer lasers at NPL.** Barwood, G.P. (National Physical Lab., Teddington (UK)). Jan 1982. 20p. NTIS, PC A02/MF A01.

Continuous wave laser oscillation was demonstrated in iodine by pumping with a krypton ion laser at 521 nm and 531 nm. Simultaneous oscillation on up to 16 lines in the range 540 nm to 650 nm was observed and over 50 lines were measured and identified. The threshold pump power is 80 mW at 531 nm. A sodium dimer laser was investigated and 27 laser lines were obtained in the range 520 nm to 560 nm by pumping with the blue lines of an argon ion laser. Up to 5 mW output power can be obtained with only 80 mW of single frequency pump power at 472.7 nm. (ESA)

21402 **(UCRL—88657) Line-coincidence schemes for producing laser action at soft-x-ray wavelengths.** Chapline, G.F. (Lawrence Livermore National Lab., CA (USA)). 12 Jan 1983. Contract W-7405-ENG-48. 14p. (CONF-830127—1). NTIS, PC A02/MF A01. Order Number DE83007352.

From Winter colloquium on quantum electronics; Snowbird, UT, USA (12 Jan 1983).

Line-coincidence schemes for producing laser action in the wavelength regime 100-30A are reviewed. Schemes involving pumping of 2→4 transitions in neon-like ions are singled out as particularly attractive.

21403 **Programmable multifunction laser.** Wayne, R.J.; Henschke, R.W.; Mongeon, R.J. US Patent Application 6-403,458. 30 Jul 1982. 16p.

This multi-format modulated laser may be programmed to produce a variety of output waveforms by applying a different one of a plurality of modulating waveforms thereto. The outputs can includes continuous waves, both modulated and unmodulated, Q-switched pulses, cavity dumped pulses, shaped pulses and mode locked pulses. The laser is provided with an intracavity electro-optic modulator and may comprise two coupled cavities with a gain cell in one cavity and the modulator in the other cavity.

21404 **Modulated infrared laser with two coupled cavities.** Wayne, R.J.; Laughman, L.M.; Mongeon, R.J.; Chenausky, P.P. US Patent Application 6-403,439. 30 Jul 1982. 15p.

The intracavity modulated laser includes a main cavity and an adjacent coupled cavity with a gain cell in the main cavity and an electro-optic modulator in the coupled cavity, the cavities being coupled in such a way that the energy level in the coupled cavity during laser operation is much lower than that in the main cavity, and whereby the modulator can selectively affect the polarization of energy in accordance with a voltage applied there-to to selectively couple energy out of both cavities in a desired manner.

21405 **(AD-A—111944) Laser journal (selected articles).** Translated from *Laser J. (China);* 8: No. 1, 5-9, 10-13, 18-20, 47-48(Feb 1982). vp. (FTD-ID(RS)T—1390-81). .

A collection of articles on laser application and technology is presented. The following topics are discussed: effects of thermal deformation in mirrors on resonator parameters, folded resonator for high power lasers, copper vapor laser, experiments and research of electron beam control XeCl quasimolecule laser.

21406 **Power shifts of a 633-nm $^{127}I_2$ stabilized He-Ne laser, for various mirror curvatures.** Rowley, W.R.C. Teddington, England; National Physical Lab. (1981). 20p. .

Beat frequency measurements were made by comparison with a reference laser, of the frequency shifts at different output powers of a 633 nm He-Ne laser stabilized by intracavity saturated absorption to hyperfine components e and f of iodine 127. Results show that at normal output powers the stabilized frequency and the power shift coefficients depend on the curvatures of the cavity mirrors. At low powers the coefficients are larger than at normal powers, but the absolute laser frequency is less sensitive to the mirror curvatures. Results indicate that certain combinations of mirror curvatures make the stabilized frequency insensitive to output power. (ESA)

4204 Heat Transfer And Fluid Flow

REFER ALSO TO CITATION(S) 19636, 19867, 20070, 20265, 20324, 20349, 20351, 20553, 20680, 20713, 21332, 21333, 21335, 21352, 21653

21407 **(ANL/NESC—198) HEATING2; transient steady-state heat transfer.** Belt, B.D. (Southern Services, Inc., Atlanta, GA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048198.

Maxima of - 750 nodes 100 material regions 40 materials.

HEATING2 is a generalized heat transfer code capable of solving transient and steady-state coordinate systems. The simplified input makes it a very useful code for those problems having geometrical configurations which can be described by parallel and perpendicular lines or planes, or concentric circles. These figures can be broken up into a maximum of 100 one-material regions with position and time-dependent volumetric heat generation rates. Up to 40 materials with constant properties can be described, and the initial temperatures of these regions are position-dependent. The boundaries of these regions can be contact, insulated, time-dependent temperature controlled, or forced convection with a time-dependent sink temperature. Also a radiation boundary with a time-dependent sink temperature is included.IBM370,3033; FORTRAN IV; OS/370; 255K bytes memory and temporary use of a direct access device (unit 7) are required for execution. 300K bytes of memory were needed for FORTRAN IV H-Extended compilation.

21408 **(ANL/NESC—286R) HOT2; two-dimensional transient heat conduction program.** Peterson, W.D. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048286.

Contact resistances are not included in the program computations, but must be approximated by use of thin regions of a low-conductivity material. Heat generation rates, boundary film coefficients, and boundary sink temperatures are assumed to be known. The program is intended to handle up to 99 regions, 5000 mesh points, 250 mesh points in each coordinate direction.

HOT2 is a digital computer program to solve two-dimensional plane and axially symmetric steady-state and transient heat conduction problems with diagonal boundaries and interfaces. Mesh spacing (at most 5000 points) is completely variable. As many as 99 regions are permitted in order to describe spatial variations in material properties, heat generation rates, and boundary conditions. The heat generation rate and boundary conditions may vary with time.CDC6600; FORTRAN IV; SCOPE 2.0; 64K memory, card reader, printer, and punch, one system disk and 4 non-system disks, each on its own channel.

21409 **(ANL/NESC—382R) RAPP; high-velocity flow study of steam-water mixtures.** Sorenson, C.W. (Knolls Atomic Power Lab., Schenectady, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048382.

Maxima of - 6 flow areas for computing pressure distribution with known flow 2000 pressure increments.

RAPP computes the relationship among mass flow, pressure, and piping resistance (k-factor) for high velocity flow of a two-phase mixture of steam and water. The source fluid may be subcooled or saturated water, saturated steam, or a mixture of steam and water. The downstream pressure must be below the saturation pressure of the source fluid. Specific applications include pressurizer surge line pressure drop and pressure distribution downstream of a relief valve.CDC6600; FORTRAN IV; SCOPE; 45K to compile and execute.

21410 **(ANL/NESC—408) TAC2D; steady-state and transient temperature calculations.** Petersen, J.F.; Clark, S.S. [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048408.

(a) The grid line system must be orthogonal in the rectangular, cylindrical, or circular coordinate system.

TAC2D is designed to treat transient, two-dimensional heat transfer problems. Steady-state problems are treated by considering the problem to be a transient, starting with an assumed temperature distribution and running until equilibrium conditions are established. Geometrically, rectangular (x,y), cylindrical (r,z), or circular (r,theta) coordinates may be used.UNIVAC1108;IBM360,370,303x; FORTRAN V (UNIVAC1108), FORTRAN IV (IBM360); EXEC2 (UNIVAC1108), OS/360 (IBM360); 65K words are required on the UNIVAC1108 and 380K bytes on the IBM360. In addition to input/output, a maximum of four and a minimum of no tapes are required depending upon the code options being used..

21411 **(ANL/NESC—414) TAC3D; transient three-dimensional heat transfer program.** Petersen, J.F. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048414.

(a) The grid plane system must be orthogonal in the rectangular or cylindrical coordiante system.

TAC3D is designed to treat transient, three-dimensional heat transfer problems. Steady-state problems are treated by considering the problem to be a transient, starting with an assumed temperature distribution and running until equilibrium conditions are established. Geometrically, the problem may be defined by either rectangular (x,y,z) or cylindrical (r,z,theta) coordinates.UNIVAC1108; FORTRAN V; EXEC2; 65K memory. A maximum of four and a minimum of no tapes are required, depending upon the code options being used..

21412 **(ANL/NESC—435) BURST1; hydrodynamic analysis during blowdown.** Jayne, G.A.; Hanson, G.H. (Idaho Nuclear Corp., Idaho Falls (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048435.

Maxima of - 50 total cylinders and adapters 2000 space-steps in the whole system 5000 time-steps Only subcooled, frictionless, adiabatic cases can be considered.

BURST1 provides for the study of pressurized liquid in a cylindrical system immediately after a rupture occurs at one or both ends of the system. Pressure, mass velocity, and enthalpy are calculated at equally-spaced mesh points along the length of the system. This is a one-dimensional representation, assuming uniform conditions throughout any given cross-sectional area. Forces on designated sections of the system can also be computed, with provision for directional changes.IBM360/75; FORTRAN IV; OS/360; 32K memory.

21413 **(ANL/NESC—440) DYNAM; dynamic analysis boiling flow steam.** Schlueter, G. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048440.

Maxima of - 30 intervals used to describe the power distribution in the nonboiling and boiling regions 29 boiling nodes 7 intervals and corresponding friction multipliers read in per case 14 exit qualities read in per case 40 superheat nodes 10 coefficients read in for the phi2 vs, x-polynomial fit 48 frequencies at which open-loop frequency response is desired 48 frequencies at which signal output is desired.

DYNAM performs a dynamic analysis of once-through boiling flow oscillations with steam superheat. The model describing the superheat regime (single-phase, variable density fluid) for subcritical pressure operation is also applicable to the study of once-through operation using supercritical pressure water.UNIVAC1108; FORTRAN; EXEC2.

21414 **(ANL/NESC—517) HEATING5;HEATING3; 1,2, or 3-dimensional heat conduction program.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Siman-Tov, I.I. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048517.

HEATING5 is designed to solve steady-state and/or transient heat conduction problems in one-, two-, or three-dimensional Cartesian or cylindrical coordinates or one-dimensional spherical coordinates. The thermal conductivity, density, and specific heat may be both spatially and temperature-dependent. The thermal conductivity can be anisotropic. Materials may undergo a change of phase. Heat generation rates may be dependent on time, temperature, and position, and boundary temperatures can be time-dependent.and/or temperature-dependent. The mesh spacing can be variable along each axis. HEATPLOT is a temperature distribution plotting program which may be used with a plotting data set produced by HEATING5 to plot temperature contours (isotherms), temperature-time profiles, and temperature-distance profiles from a temperature distribution or from temperature changes relative to an initial temperature distribution. REGPLOT is a pre-processor graphics program which generates maps of the regions with labels for the materials, the heat generation function numbers, the initial condition function numbers, and the boundary condition function numbers specified by the input data to permit the user to visually check the HEATING5 input data. HEATING3 is designed to solve steady-state and/or transient heat conduction problems in one-, two-, or three-dimensional cartesian or cylindrical coordinates. Thermal conductivity, density, and specific heat may be dependent on temperature. Heat generation rates may be dependent on position and time, and the boundary temperatures may be time-dependent.

21415 (ANL/NESC—858) APACHE; two-dimensional chemically reactive fluid flow code. Ramshaw, J.D.; Dukowicz, J.K. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048858.

The fluid is assumed to be an ideal-gas mixture with temperature-independent specific heats. Chemical reactions are assumed to be elementary. Current dimensioning in the program allows only one rotational and vibration level of the lasing species to be considered and a maxima of - 1 chemical reaction 10 chemical species 32 cells in the horizontal direction 22 cells in the vertical direction These restrictions may be increased by increasing the values of the appropriate parameter variables and the corresponding DIMENSION statements.

APACHE is a time-marching finite-difference code developed to solve the equations of transient viscous multicomponent chemically reactive fluid dynamics in two space dimensions. A steady-state solution is obtained as the asymptotic limit of a transient calculation.CDC7600; FORTRAN IV; SCOPE; APACHE requires 33,000 (octal) words of small core memory and 56,000 (octal) words of large core memory.

21416 (ANL/NESC—859) SOLA-LOOP; two-phase flow network analysis. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Torrey, M.D. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048859.

Conservation of momentum is not required by the finite difference approximations used for the momentum equation. Current dimensioning in the SOLA-LOOP program allows maxima of - 10 components 8 segments per component 200 junctions 6 time levels, pressure groups, and vapor production rates per cell 5 boundary data sets These restrictions may be adjusted by changing the values of the variables NP, NS, NJ, NK, and NM, respectively, and all appropriate DIMENSION statements.

SOLA-LOOP is designed for the solution of transient two-phase flow in networks composed of one-dimensional components. The fluid dynamics is described by a nonequilibrium, drift-flux formulation of the fluid conservation laws. Although developed for nuclear reactor safety analysis, SOLA-LOOP may be used as the basis for other types of special-purpose network codes. The program can accommodate almost any set of constitutive relations, property tables, or other special features required for different applications.CDC7600,6600; FORTRAN IV; SCOPE; 34,000 (octal) words of memory are needed to execute the program.

21417 (ANL/NESC—865) PELE-IC; fluid-structure interaction analysis. McMaster, W.H.; Gong, E.Y. (Lawrence Livermore National Lab., CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048865.

PELE-IC is a two-dimensional semi-implicit Eulerian hydrodynamics program for the solution of incompressible flow coupled to flexible structures. The code was developed to calculate fluid-structure interactions and bubble dynamics of a pressure-suppression system following a loss-of-coolant accident (LOCA). The fluid, structure, and coupling algorithms have been verified by calculation of benchmark problems and air and steam blowdown experiments. The code is written for both plane and cylindrical coordinates. The coupling algorithm is general enough to handle a wide variety of structural shapes. The concepts of void fractions and interface orientation are used to track the movement of free surfaces, allowing great versatility in following fluid-gas interfaces both for bubble definition and water surface motion without the use of marker particles.CDC7600; FORTRAN IV; SCOPE 2.1, LTSS; 123,000 (octal) words of SCM and 272,000 (octal) words of LCM are used.

21418 (ANL/NESC—900) SALE2D; general transient fluid flow algorithm. Amsden, A.A.; Hirt, C.W. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048900.

Source decks (FORTRAN 2427 cards, UPDATE 2025 cards) Sample problem (43 cards) Reference report, LA-8095.

SALE2D calculates two-dimensional fluid flows at all speeds, from the incompressible limit to highly supersonic. An implicit treatment of the pressure calculation similar to that in the Implicit Continuous-fluid Eulerian (ICE) technique provides this flow speed flexibility. In addition, the computing mesh may move with the fluid in a typical Lagrangian fashion, be held fixed in an Eulerian manner, or move in some arbitrarily specified way to provide a continuous rezoning capability. This latitude results from use of an Arbitrary Lagrangian-Eulerian (ALE) treatment of the mesh. The partial differential equations solved are the Navier-Stokes equations and the mass and internal energy equations. The fluid pressure is determined from an equation of state and supplemented with an artificial viscous pressure for the computation of shock waves. The computing mesh consists of a two-dimensional network of quadrilateral cells for either cylindrical or Cartesian coordinates, and a variety of user-selectable boundary conditions are provided in the program.CDC7600,CYBER175; FORTRAN IV; SCOPE 2.1, LTSS, NOS 1.3; 165,000 (octal) words of memory are required for the report version, which allows up to 800 mesh points. The memory requirement will increase if more mesh points are used.

21419 (ANL/NESC—934R) NASA; MHD-modified chemical equilibrium code. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy, J.H.; Doss, E.D. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048934.

Maxima of - 250 species 5 elements per species In the computation of the electrical properties of the plasma, only the following species are considered: hydroxyl, cesium, argon, carbon monoxide, carbon dioxide, nitrogen, oxygen, water, nitric acid, potassium hydroxide, sulfur dioxide, potassium, and electrons.

NASA is a substantially modified release of the NASA-Lewis computer program for chemical equilibrium compositions. The modifications were designed to extend the program to perform combustor analysis for MHD systems studies. NASA calculates the thermodynamic and electrical properties of a chemically reactive gas mixture. The rocket, detonation, and constant volume equilibrium options of the parent code have been deleted. The new features added include: a) a routine for computing the electrical properties of the equilibrium mixture, b) shorthand input data option for treating standard hydrocarbon fuels, c) a facility for incorporating heat losses in the NASA HP mode computations, and d) a printed summary of equilibrium thermodynamic properties.IBM370,303x; FORTRAN (42%) and PL/I (58%); OS/MVT; 300K bytes of memory are generally sufficient to execute the NASA program.

21420 (ANL/NESC—948) SOLA-VOF; transient fluid flow free boundaries. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Hotchkiss, R.S. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048948.

The setting of array dimensions is controlled through PARAMETER statements.

SOLA-VOF is a program for the solution of two-dimensional transient fluid flow with free boundaries, based on the concept of a fractional volume of fluid (VOF). Its basic mode of operation is for single fluid calculations having multiple free surfaces. However, SOLA-VOF can also be used for calculations involving two fluids separated by a sharp interface. In either case, the fluids may be treated as incompressible or as having limited compressibility. Surface tension forces with wall adhesion are permitted in both cases. Internal obstacles may be defined by blocking out any desired combination of cells in the mesh, which is composed of rectangular cells of variable size.CDC7600,CYBER175; FORTRAN FTN5 compiler; SCOPE (CDC7600), NOS (CDC CYBER175); 72,000 (octal) words of memory.

21421 (CONF-820614—6) Two-fluid model and importance of the interfacial area in two-phase flow analysis. Ishii, M.; Mishima, K.; Kataoka, I.; Kocamustafaogullari, G. (Argonne National Lab., IL (USA); Wisconsin Univ., Milwaukee (USA)). 1982. Contract W-31-109-ENG-38. 9p. NTIS, PC A02/MF A01. Order Number DE83007615.

From 9. US national congress of applied mechanics; Ithace, NY, USA (21 Jun 1982).

The interfacial transfer terms are the weakest link in a two-fluid model formulation because of considerable difficulties in terms of experimentation as well as modeling. However, these terms are of supreme importance for a two-fluid model in determining phase interactions between liquid and vapor. In view of these, the interfacial transfer terms have been studied in detail and new constitutive relations have been developed. The interfacial terms are proportional to the interfacial area and driving force, therefore these two effects are modeled separately. 7 figures, 30 references.

21422 (DOE/METC—82-51, pp 109-111) PETC advanced research and technology development - surface gasification - high pressure fluidization cold model research. Strakey, J.P. (Pittsburgh Energy Tech. Center, PA). Sep 1982. NTIS, PC A10/MF A01.

From 2. annual advanced gasification projects contractors' meeting; Morgantown, WV, USA (22 Jun 1982).

The objective of this project is to develop a data base for the effect of pressure on fluidization parameters such as: minimum fluidization velocity, complete fluidization velocity, minimum bubbling velocity, bubble size, bubble velocity, jet penetration distance, distributor design effects, etc. Work to develop a data base for the effect of pressure on fluidization parameters is essential for the design and scale-up of gasifiers, such as the Westinghouse gasifier. Availability of such data in the literature is severely limited. The almost unique nature (it is one of only two such units known to exist in the United States) of this unit accentuates its value as a tool for developing a high pressure fluidization data base. Preliminary results are: minimum fluidization velocity decreases slightly with an increase in pressure; complete fluidization velocity decreases dramatically with an increase in pressure and seems to approach a minimum value at a pressure that may depend somewhat on particle size distribution; minimum bubbling velocity increases significantly with an increase in pressure and seems to approach a maximum value at a pressure that may depend somewhat on particle size distribution; bed height normally increases with increased superficial gas velocity. At high pressures a characteristic phenomenon is displayed. A point is reached in which the bed height actually decreases for a time with increased superficial velocity; the bed height then again begins to increase with increasing superficial velocity. Also completed were a series of photographic tests using an 8-inch two-dimensional plexiglas model. The purpose of these tests was to compile a visual library of information concerning bubbling beds.

21423 (LA-UR—83-519) Finite-element approach to analyzing coupled thermal-hydraulic problems. Bennett, J.G.; Girrens, S.P.; Cort, G.E.; Graham, A.L.; Johnson, N.L. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 12p. (CONF-830320—1). NTIS, PC A02/MF A01. Order Number DE83007565.

From 3. international conference on numerical methods in thermal problems; Seattle, WA, USA (1 Mar 1982).

The finite-element method is used to study thermal-hydraulic systems to determine the pressures and temperatures necessary to obtain an engineering description of a convecting fluid. The fluid-motion formulation utilizes nonlinear flow-resistance coefficients based on experimentally determined relationships associating the hydraulic gradient and velocity field for steady flows. The code developed may also be used in a noncoupled mode to perform either transient thermal analysis or steady laminar fluid flow. Problems analyzed demonstrating code applicability to engineering problems include target design in a proton accelerator, nonlinear free-surface porous flow, multi-layered convecting flow patterns observed in solar-pond simulation experiments, and convective flow/structural interaction in reactor-safety studies.

21424 (N—82-20004) Some aspects of two-phase flow, heat transfer and dynamic instabilities in medium and high pressure steam generators. Unal, H.C. (Technische Hogeschool Delft (Netherlands)). Mar 1981. 249p. NTIS, PC A11/MF A01.

Experimental data for void fraction, incipient point of boiling, initial point of net vapor generation, bubble dynamics, dryout, two-phase flow pressure drop and density-wave oscillations were obtained in long, sodium heated steam generator tubes of different geometries for a wide range of operating conditions and at medium and high pressures. These data and data from literature taken in sodium and electrically heated steam generator tubes were correlated. Aspects of two-phase flow, heat transfer and density-wave oscillations in these steam generators disclosed include the distribution factor in small- and medium-size diameter steam generator tubes, the characteristic of the transitions at the incipient point of boiling and initial point of net vapor generation, bubble growth during subcooled nucleate flow boiling, the importance of the equivalent length for dryout in non-uniformly heated steam generator tubes and the mechanisms of density-wave oscillations in once-through steam generator tubes.

21425 (NP—3900025) Evaluation of transient heat transfer in parallel tube bundles by the Monte-Carlo-Method. Dobbernack, R. (Technische Univ. Braunschweig (Germany, F.R.). Fakultaet fuer Maschinenbau und Elektrotechnik). 14 Dec 1979. 120p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83900025.

Thesis.

The aim of the present paper is to describe by means of a physical/mathametical model the transient heat transfer by radiation in parallel tube bundles as a function of geometrical variations, material properties, and mathematical interrelationships of radiation. The study is based on a three-dimensional approach in order to be able to describe with the results obtained the influences on the heat transfer in steam generator tube bundles as well as the conditions in burnable configurations. In the first part of the paper the absorption numbers are determined by means of a FORTAN IV computer code. The results are discussed as a function of the parameters chosen. In the second part of the paper the transient cooling-down behavior of tube bundles is investigated, thermal radiation and free convection between the tubes and heat conduction in the tube wall being taken into account. For this purpose another code was written the results of which describe the time-dependent temperatures of all segments, arbitrary tube geometries for the bundle being prescribed.

21426 (NP—3901009) Investigations of an airlift reactor with external circulation with respect to its application as a bioreactor. Weiland, P. (Dortmund Univ. (Germany, F.R.). Abt. Chemietechnik). 15 Dec 1978. 174p. (In German). NTIS (US Sales Only), PC A08/MF A01. Order Number DE83901009.

Thesis.

In the present paper the fluid dynamics as well as the mixing and mass transfer behavior of an airlift reactor with external circulation were investigated and compared with the behavior of bubble columns. In view of the application as a bioreactor the studies were made with material systems of different ionic strength, surface tension and viscosity. All of the experiments were made of a pipe loop with a gas-loaded liquid level of 8.51 m. The reactor diameter of the gas-loaded up-flow region of the airlift reactor could be varied towards the behavior of a discontinuous bubble column by means of throttling the circulating fluid flow. Direct comparison of both operating modes thus became possible. The results of measurement showed that the airlift reactor with external circulation is an appropriate gas injecting equipment for performing biological reactions. The relatively high gas loads required for sufficient oxygen supply and the special flow characteristics of the reactor leading to reduced formation of gas bubbles make this type of reactor appear especially suited for large construction heights. Reactors of the design investigated here were used already in a number of cases in pilot plants for production of proteins from single-celled organisms.

21427 **(SAND—79-1623(Rev.)) MARIAH - a finite-element computer program for incompressible porous-flow problems: user's manual.** Gartling, D.K.; Hickox, C.E. (Sandia National Labs., Albuquerque, NM (USA)). Jan 1983. Contract AC04-76DP00789. 104p. NTIS, PC A06/MF A01. Order Number DE83006847.

MARIAH is a finite-element computer program designed for the solution of two-dimensional, incompressible flows in a porous media, including the effects of heat transfer. The program capabilities and complete user instructions are presented. Several example problems are described in detail to demonstrate the use of the program. The theoretical background for MARIAH is documented in the Sandia National Laboratories Report, SAND79-1622

21428 **Forced-convective post-CHF heat transfer and quenching.** Nelson, R.A. (Associate Mem. ASME, EG & G Idaho, Inc., Idaho Falls, Idaho 83415). *Journal of Heat Transfer;* **104**: No. 1, 48-54(Feb 1982). Contract AC07-76ID01570.

Mechanisms in the postcritical heat flux region that provide understanding and qualitative prediction capability for several current force-convective heat-transfer problems are discussed. In the area of nuclear reactor safety, the mechanisms are important in the prediction of fuel rod cooldown and quenches for the reflood phase, blowdown phase, and possibly some operational transients with dryout. Results using the mechanisms to investigate forced-convective quenching are presented. Data reduction of quenching experiments is discussed, and the way in which the quenching transient may affect the results of different types of quenching experiments is investigated. This investigation provides an explanation of how minimum wall superheats greater than the homogeneous nucleation temperature result, as well as how these may be either hydrodynamically or thermodynamically controlled.

21429 **High Rayleigh number laminar convection in low aspect ratio enclosures with adiabatic horizontal walls and differentially heated vertical walls.** Tichy, J.; Gadgil, A. (Assistant Professor, Department of Mechanical Engineering, Rensselaer Polytechnic Institute, Troy, New York 12181, Mem. ASME). *Journal of Heat Transfer;* **104**: No. 1, 103-172(Feb 1982). Contract W-7405-ENG-48.

Laminar flow in shallow horizontal cavities (aspect ratio $a<<1$) at high Rayleigh numbers ($>10^6$) is investigated using an approximate analysis based on first principles, and also with numerical solutions to the full equations. A Prandtl number of approximately one is assumed. It is found that the flow regime at such high values of Ra is characterized by boundary layers lining both vertical as well as horizontal walls of the enclosure, and is qualitatively different from the flow regimes at lower Rayleigh numbers. The internal region of the core (near to the horizontal centerline) exhibits linear velocity and temperature profiles. Typical isotherms and streamlines characteristic of this flow regime are presented, based on the numerical solutions. The velocity and temperature profiles predicted from the approximate analysis are found to compare well with those obtained from the numerically obtained solutions. The Nusselt numbers predicted from the analysis are also in good agreement with the numerical solutions, and with the limited experimental data in the literature. The various physical processes in this type of flow are discussed based on the findings of the analytical and numerical studies.

21430 **(CAPE—2677) Practical heat conduction for everyday problems (CE3142) (Engineering Materials).** (Lawrence Livermore National Lab., CA (USA)). [nd]. Contract W-7405-ENG-48. TIC. Order Number DE83006217.

Methods that allow one to simply assess heat conduction problem areas that occur during design reviews or everyday work are presented. Emphasis is on quick answer techniques. Complex solution methods will not be covered in great detail. This is a 6 lecture course: (1) energy balance, lumped system, heat equation, response time estimate; (2) electrical circuit analogy for heat conduction, how to determine whether your problem is 1 or 2 dimensional heat conduction, problems with heat conduction, problems with heat generation, contact resistance; (3) lumped mass, distributed mass-1D wall, how to determine if a problem is lumped or distributed, significance of time estimate formulations; (4) how to use chart solutions; (5) what to use and when to use it; and (6) mathematical analysis.

4205 Materials Testing

REFER ALSO TO CITATION(S) 19977

21431 **(GEPP-TIS—699) Interfacing a torsion pendulum with a microcomputer.** Bush, J.A.; Newby, J.W. (General Electric Co., St. Petersburg, FL (USA). Neutron Devices Dept.). 24 Feb 1983. Contract AC04-76DP00656. 15p. NTIS, PC A02/MF A01. Order Number DE83004032.

Shear modulus testing is performed on the torsion pendulum at the General Electric Neutron Devices Department (GEND) as a means of gauging the state of cure for a polymer system. However, collection and reduction of the data to obtain the elastic modulus necessitated extensive operator involved measurements and calculations, which were subject to errors. To improve the reliability of the test, an analog-to-digital interface was designed and built to connect the torsion pendulum with a minicomputer. After the necessary programming was prepared, the system was tested and found to be an improvement over the old procedure in both quality and time of operation. An analysis of the data indicated that the computer generated modulus data were equivalent to the hand method data, but potential operator errors in frequency measurements and calculations were eliminated. The interfacing of the pendulum with the computer resulted in an overall time savings of 52 percent.

21432 **(INIS-mf—7211) Contribution to the determination of J-integral and crack opening displacement as material characteristics and their application in safety-assessments of pressure vessels.** Mildner, H. (Technische Univ., Vienna (Austria)). May 1981. 111p. (In German). NTIS (US Sales Only), PC A06/MF A01/ Also available by loan from the TU Vienna, Austria Sign. 156.350 II/Diss.. Order Number DE83780156.

Thesis (Dr. techn.).

For fracture mechanics assessment of the safety of metal structures some material characteristics are necessary, which should be independent of the dimensions of the tested specimens. For the required minimum dimensions of the specimens some conditions are known, which, however, are inexact or contradictory, especially in the case of elastic-plastic materials behaviour. In this work the influence of specimen dimensions on elastic-plastic fracture mechanics values is investigated for structural steel in three states of heat treatment (normalized, quenched and tempered, coarse grain annealed). Standard specimens with greatly differing dimensions are tested according to J-integral- and COD-standards and are evaluated with regard to fracture initiation. Conditions for specimen dimension for structural steel are derived from the test results, depending on micro-structure and test temperature. If these conditions are not satisfied, the material characteristics measured in the upper shelf region are somewhat too low. Testing at different temperatures shows here, that there is a contrary influence on the material characteristics by specimen size and test temperature. The comparison of J-integral- and COD-test results shows that both methods produce practically equal fracture toughness values and that there is plane strain condition in the specimens at fracture initiation. From plates of the above-mentioned quenched and tempered steel several pressure vessels were welded. Artificial flaws were put into them and they were subjected to burst tests. The burst behaviour of the pressure vessels can be assessed with elastic-plastic material characteristics and fracture mechanics calculations. (author).

21433 **Reliability of systems of dependent components.** George, L.L.; Wells, J.E. (Lawrence Livermore Natl Lab, CA). *Transactions of the Annual Technical Conference, American Society for Quality Control;* 154-160(May 1981).

A method is developed to compute the reliability of a multiple component system. This method computes system reliability accurately because the program represents dependent component failures. Component failure occurs if the random stress applied to the component exceeds its random strength. System failure occurs if any cut set of components fails. The method also determines which components or parameters have the largest effect on system failure probability.

4206 Safety Engineering

REFER ALSO TO CITATION(S) 20609

21434 (ANL/NESC—451) SAFE-CRACK; viscoelastic analysis of concrete. Rashid, Y.R. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048451.

Maxima of - 300 nodes 675 elements 70 time-steps.

SAFE-CRACK performs a visco-elastic analysis of plane and axisymmetric composite concrete structures subjected to transient temperature and mechanical loadings. The specific creep of concrete as an age and temperature-dependent function, and concrete failure under combined stresses are considered. Particular emphasis is placed on the cracking analysis in concrete structures and the nonlinear dependence of creep property on transient temperature.UNIVAC1108; FORTRAN V; EXEC2; 65K memory and 13 tapes.

21435 (ANL/NESC—452) SHELL5; thin shell 3-dimensional structural analysis. Prince, N. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048452.

Maxima of - 1000 nodal points 2000 elements The maximum difference allowed for coupled nodal point indexes is 23.

SHELL5 performs an elastic stress analysis of smoothly curved, arbitrarily shaped, three-dimensional thin shells with any desired distributions of material properties, boundary constraints, and mechanical, thermal, and displacement loading conditions.UNIVAC1108; FORTRAN V; EXEC2; 65K memory, 5 tapes, 3.5 million word drum area.

21436 (ANL/NESC—497R) RELO2; failure probability calculation by Monte Carlo. Rauth, D.R.; Smith, C.M. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048497.

The number of random selections of the applied stress is restricted to 2000.

RELO2 computes the failure probability for a single failure mode. Six options are available: option 1 calculates the interaction of two normally-distributed variates, option 2 calculates the interaction of two truncated normally-distributed variates, option 3 calculates the interaction of a normal variate with a Weibull variate, option 4 calculates the interaction of two Weibull distributions, option 5 calculates the interaction of a truncated normal variate with a Weibull variate, and option 6 calculates the interaction of a truncated normal and uniform variate.CDC6600,7600; FORTRAN IV; SCOPE 3.1; 74,000 (octal) words of memory are required for execution on the CDC6600 or 55,000 (octal) words of memory for execution on the CDC7600.

21437 (ANL/NESC—537R) M0678;FUGIT1; dynamic response of elastic structures. Friedrich, C.M. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048537.

1 to 6 degrees of freedom in the base motion 1 to 30 rows and columns in the flexibility matrix 0 to 3 types of damping.

FUGIT1 performs a transient step analysis of an elastic structure mounted on a rigid base which has a given shock history of motion. The structure may have nonlinear constraints and damping.CDC6600; FORTRAN IV; SCOPE; Input tape, output tape, 150,000 (octal) central memory, plot routines.

21438 (ANL/NESC—539) STRAP; static & dynamic structural analysis. Dearien, J.A.; Uldrich, E.D. (EG and G Idaho, Inc., Idaho Falls (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048539.

STRAP-S maxima - 250 degrees of freedom 100 members STRAP-D maxima - 100 degrees of freedom 80 time-steps in the forcing function input.

The code STRAP (STructural Analysis Package) was developed to analyze the response of structural systems to static and dynamic loading conditions. STRAP-S solves for the displacements and member forces of structural systems under static loads and temperature gradients. STRAP-D will solve numerically a given structural dynamics problem.IBM360; FORTRAN IV; OS/360; 300K bytes of memory for each program plus 5 to 7 direct access storage devices besides standard I/O for STRAP-D.

21439 (LA—9624-M) EVENT user's manual: a computer code for analyzing explosion-induced gas-dynamic transients in flow networks. Tang, P.K.; Andrae, R.W.; Bolstad, J.W.; Gregory, W.S. (Los Alamos National Lab., NM (USA)). Jan 1983. Contract W-7405-ENG-36. 88p. NTIS, PC A05/MF A01. Order Number DE83007150.

This report contains supporting information for the computer code EVENT, which can predict explosion-induced gas-dynamic transients in flow networks. The code is capable of analyzing transients in any arbitrarily designated interconnections in a network of building rooms and ventilation systems. The EVENT code is designed to provide improved methods of safety analysis for the nuclear, chemical, and mining industries. A lumped-parameter formulation is used. This version of the EVENT code is particularly suitable for calculating the detailed effects of explosions in the far field using a parametric representation of the explosive event. The input for the code and a sample problem that illustrates the code's capabilities are provided.

21440 (NP—2902736) Control and dispersion of hazardous gas clouds with water sprays. van Doorn, M. (Technische Hogeschool Delft (Netherlands). Afdeling Technische Natuurkunde). Sep 1981. 171p. NTIS (US Sales Only), PC A08. Order Number DE82902736.

This thesis considers water sprays as a means of reducing the hazards arising from escaped gas clouds. In view of the resistance to mass transfer dispersion of a cloud is generally more promising than physical or chemical ab/adsorption. The main objective of the dispersing action is rapidly to mix the gas with a large amount of air, in order to diminish the chance of calamity. The spray curtain is considered as an air pump and the important parameters for this aspect of performance have been studied.

4208 Electronic Circuits And Devices

REFER ALSO TO CITATION(S) 20903, 21477, 21495, 21558, 21621

21441 (DOE/ER/10459—38) Studies of sub-micron devices with emphasis on MOS systems. Progress report, July 1, 1982-June 30, 1983. O'Connell, R.F. (Louisiana State Univ., Baton Rouge (USA). Dept. of Physics and Astronomy). 1983. Contract AS05-79ER10459. 12p. NTIS, PC A02/MF A01. Order Number DE83007336.

This progress report is primarily concerned with a program of analysis of the so-called two dimensional electron gas which occurs on semiconductor surfaces in MOS systems and on the free surface of liquid helium. (GHT)

21442 (DOE/SF/00515—T3) Chopper control board check out: summary of chopper operation. PEP storage ring magnets and power supply system. Fuller, R.W. (Stanford Linear Accelerator Center, CA (USA)). 1 Apr 1982. Contract AC03-76SF00515. 10p. NTIS, PC A02/MF A01. Order Number DE82014963.

The chopper can be simplified by comparing its main SCR (or SCR's) to a switch being easily turned on with the main firing pulse (pulses) from the controller board. The commutator SCR is also a switch which turns on a ringing circuit that can shut off the main SCR and reset itself when given about 80 micro seconds to complete its cycle. Therefore, by operating the main SCR's for a longer or shorter time into a magnet and repeating this cycle many times a second so that the magnet smoothes out the variations in current, a regulated current can be maintained in the magnet. If the commutator firing pulse is delayed further in time the current in the magnet will increase. If the main pulse is followed shortly by the commutator pulse, current in the magnet will decrease. The increments of increase or decrease are very small due to the shortness of the cycle compared to the time constant of the magnet. The purpose of the pulse controller is then to deliver a main pulse trian and a commutator pulse train properly spaced for regulation in the 400A chopper. For the 1400 A chopper the main pulses must also be alternated between two SCR's so they can share the load current. The controller also establishes limits for the pulses to allow safe operation for the magnet and the chopper. The minimum pulse length to the magnet is 20% of the period at 2000 hertz. The maximum pulse length is 95% of the period at 2000 hertz. Some of the choppers run at 360 hertz, for this lower frequency the minimum pulse length is 1.8% of the period (the same number of micro-seconds), and the maximum length is 99% of the period. Note that the lower frequency gives a wider range at a sacrifice of frequency response.

21443 (GEPP-TIS—667a) Field shaping to improve vacuum-diode voltage holdoff. Furno, E.J.; Shafer, R.E. (General Electric Co., St. Petersburg, FL (USA). Neutron Devices Dept.). 15 Feb 1983. Contract AC04-76DP00656. 19p. NTIS, PC A02/MF A01. Order Number DE83008123.

In our work we need a small vacuum diode which will reliably hold off a pulse voltage in excess of 150 kV. These diodes typically have an interelectrode spacing of 6 to 10 mm with a glass insulator length 3 to 4 times the interelectrode spacing. We found that the overall holdoff voltage for a diode with a fixed insulator and interelectrode gap length was strongly affected by the position of the interelectrode gap. Experiments were made with two sizes of diodes, varying the location of the interelectrode space from the negative end to the positive end. The large diode high voltage holdoff ranged from 240 kV with the interelectrode space at the negative end to 180 kV with the interelectrode space in the middle of the insulator. The smaller diode high voltage holdoff ranged from a high of 200 kV with the interelectrode space at the negative end to 130 kV with the interlectrode space at the positive end. The minimum at the middle was not as pronounced in this diode. Since most of the high voltage breakdowns were across the glass insulator, electron avalanching was suspected. Computer generated field plots confirmed this possibility. With the interelectrode space at the negative end, the field lines direct any field emission electrons from the triple junction or the edge of the negative electrode away from the glass. All other configurations direct the electrons toward the glass. Thus shaping the field so that any field emission electrons are directed away from the insulator improves the high voltage holdoff by minimizing the probability of an avalanche type surface breakdown.

21444 (LA-UR—83-407) Ka-band microwave generation using the Smith-Purcell effect. Ekdahl, C.A.; Davis, H.A. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 8p. (CONF-830314—4). NTIS, PC A02/MF A01. Order Number DE83007556.

From 2. national conference on high power microwave technology; Adelphi, MD, USA (1 Mar 1983).

The CERETRON microwave generator concept relies on the conversion of intense relativistic electron beam (REB) energy into highpower microwave emission through the Smith-Purcell effect. We report initial results from experiments with the production of Ka-band Smith-Purcell radiation generated by a 50-kA, 2.8-MeV beam propagated through a cylindrical transmission grating with lambda$_0$ = 1 cm. These experiments were performed without a quasi-optical resonator, and the output was limited by breakdown of the grating and by limited access through the 90-kG magnet coil. Nevertheless, the measured power output from these initial experiments was about 7 kW in the Ka band.

21445 (UCRL—50025-82-2) Electronics Engineering Department quarterly report No. 2, 1982. (Lawrence Livermore National Lab., CA (USA)). Oct 1982. Contract W-7405-ENG-48. 27p. NTIS, PC A03/MF A01. Order Number DE83007213.

The work of the Electronics Engineering Department at LLNL includes applied research, technology base development and programmatic application of methods in signal processing, image processing, and control systems. This progress report focuses on: computers and software for applications of an training programs related to signal processing; the development of a facility for the interactive processing of images; and the design, analysis and LLNL applications of control systems. (LCL)

21446 High-sensitivity resistivity technique for studies of defect behavior. Tzanetakis, P.; Birnbaum, H.K. (University of Illinois, Materials Research Laboratory and Department of Metallurgy and Mining Engineering, Urbana, Illinois 61801). *Review of Scientific Instruments;* **54**: No. 3, 366-368(Mar 1983).

An experimental method for measurement of the contribution to the electrical resistivity due to solutes or defects is described. This technique, which is based on an ac Kelvin Double Bridge may be used at elevated temperatures and does not require the use of liquid helium. The resistivity caused by solutes or defects, rho/sub x/s, can be determined at temperatures near 300 K with an accuracy of better than Δrho/sub x/s/rho/sub x/sroughly-equal10^{-3}; with the major source of error being the accuracy to which the material resistivity is known. Relative changes in the solute (defect) resistivity can be measured with a precision of 5 x 10^{-10} Ω cm. A specimen design and mounting procedure, which takes advantage of the high bridge sensitivity, is described.

21447 (SAND—83-6000) Bonding wire for semiconductor-element use. Kaisha, T.K.K.K. (Sandia National Labs., Albuquerque, NM (USA)). Jan 1983. Contract AC04-76DP00789. Translation of Patent Application No. 1980-73622. 7p. NTIS, PC A02/MF A01. Order Number DE83007239.

This invention relates to a bonding wire used to make electrical connection between a chip electrode and the external lead of a semiconductor element. The patent specifies the use of palladium wire with purity greater than 99.97% or better by weight ratio. (LCL)

21448 Fast transient digitizer. Villa, F. (to Dept. of Energy). US Patent 4,364,029. 14 Dec 1982. Filed date 8 Jul 1981. vp.

PAT-APPL-281453.

Method and apparatus for sequentially scanning a plurality of target elements with an electron scanning beam modulated in accordance with variations in a high-frequency analog signal to provide discrete analog signal samples representative of successive portions of the analog signal; coupling the discrete analog signal samples from each of the target elements to a different one of a plurality of high speed storage devices; converting the discrete analog signal samples to equivalent digital signals; and storing the digital signals in a digital memory unit for subsequent measurement or display.

21449 Impedance measurement method for double-gap klystron cavity. Zhao, Y.X. (Stanford Linear Accelerator Center, CA). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Electron Devices;* **ED-29**: No. 2, 316-320(Feb 1982). Contract AC03-76SF00515.

A new method has been developed for measuring the impedance of a two-gap cavity used in high-power klystrons. The principle is based on network analysis. The cavity under test is considered as a microwave network. The two gaps of the cavity and its output terminal are referred to as three ports. An impedance matrix can then be used to characterize this system, and the six independent impedance parameters can be found by measuring the input impedance seen from the output waveguide when the gaps are in different conditions; viz., either open, shorted, or perturbed. The gap impedance then can be deduced therefrom. It is shown that there are three impedances for a double-gap cavity instead of one for a single-gap cavity. Another problem dealt with here is how to evaluate the capacitance introduced by the perturbation. A few typical experimental results are presented.

4209 Waste Processing Plants And Equipment

REFER ALSO TO CITATION(S) 20969

21450 (ORNL/MIT—347) **Assessment of parameters in the simulation of an ANFLOW municipal-wastewater-treatment pilot plant.** Hata, W.Y.; Leis, J.R. (Oak Ridge National Lab., TN (USA)). Feb 1983. Contract W-7405-ENG-26. 88p. NTIS, PC A05/MF A01. Order Number DE83007178.

An assessment of the parameters used in a computer program which dynamically models an anaerobic upflow (ANFLOW) bioreactor was performed. The problem was scrutinized for the proper interprethation of cited literature references, suitable documentation, applicability of assumptions, and agreement with pilot-plant data. Single-variable sensitivity analyses indicated tat increased bacterial loading can increase the removal of organic materials and that changes in decay rate constants greatly affect the operational stability of the bioreactor. These findings imply that a clearer understanding of the kinetics is essential for the program to quantitatively predict reactor performance. Correlation of tracer residence-time-distribution data by the Box optimization technique indicated that the reactor was best characterized as a series of three unequal-volume CSTRs with volume ratios of 1:3:6.

4210 Combustion Systems

REFER ALSO TO CITATION(S) 19593, 19626, 19631, 19641, 19645, 19684, 19784, 19956, 20242, 20245, 20246, 20258, 20264, 20276, 20867, 20900, 20939

21451 (DOE/MC/14129—1392) **Fluidised-bed combustion. Burning coal-water mixtures in a pressurised fluidised bed: some initial results.** (National Coal Board, Leatherhead (UK). Coal Utilization Research Lab.). Feb 1983. Contract AC21-80MC14129. 51p. NTIS, PC A04/MF A01. Order Number DE83007921.

The feeding of coal-water mixtures (CWMs) into a pressurised fluidised-bed combustor (PFBC) could considerably simplify the more usual method of pneumatically-feeding dried coal from lock hoppers. The UK National Coal Board has developed a flow sheeting computer package ARACHNE, and it has been used to evaluate the effect of additional moisture on cycle efficiency and plant output. The evaluation showed that operation with a CWM containing 30% water would lower the cycle efficiency by only 0.8 percentage point and have little effect on the overall plant output. An experimental program is being undertaken at CURL, to assess the performance (e.g., combustion efficiency, sulphur retention) when burning CWMs. Some initial tests are described. Operation using CWMs with solids contents of 65, 70 and 75% was extremely steady with excellent control of bed temperature. Combustion efficiency was greater than 99% at 1560°F bed temperature and about 98% at 1380°F bed temperature, which equals efficiencies obtained when burning normal crushed coal at comparable conditions in this combustor. Sulphur retention performance was somewhat better than has been obtained with a normal (high sulphur) crushed coal in this combustor with the same sorbent. NO/sub x/ emissions varied between 0.25 and 0.47 lb/10^6 Btu, depending on excess air - similar to values obtained on other rigs with normal crushed coal. Results from the limited tests carried out so far are extremely promising. Further tests are planned. (LCL)

21452 (NASA-CASE-GSC—12354-1) **Inorganic spark chamber frame and method of making the same.** Heslin, T.M. (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center). Apr 1982. 9p. Avail: US Patent and Trademark Office.

Filed 7 Mar. 1980 Supersedes N80-20565 (18 - 11, p 1420).

A spark chamber frame, manufactured using only inorganic materials is described. The spark chamber frame includes a plurality of beams formed from inorganic material, such as ceramic or glass, and are connected together at ends with inorganic bonding material having substantially the same thermal expansion as the beam material. A plurality of wires formed from an inorganic composition are positioned between opposed beams so that the wires are uniformly spaced and form a grid. A plurality of hold down straps are formed of inorganic material such as ceramic or glass having substantially the same chemical and thermal properties as the beam material. Hold down straps overlie wires extending over the beams and are bonded thereto with inorganic bonding material.

21453 (NASA-CR—165061) **Investigations of flowfields found in typical combustor geometries.** Lilley, D.G.; Mclaughlin, D.K. (Oklahoma State Univ., Stillwater (USA)). Jul 1981. 243p. NTIS, PC A11/MF A01.

The flowfields of gas turbine combustion chambers were investigated. Six flowfield configurations with sidewall angles alpha 90 and 45 deg. and swirl vane angles phi 0, 45 and 70 deg. are characterized. Photography of neutrally-buoyant helium-filled soap bubbles, tufts, and injected smoke helps to characterize the time-mean streamlines, recirculation zones and regions of highly turbulent flow. Five-hole pitot probe pressure measurements allow the determination of time-mean velocities u, v and w. An advanced computer code equipped with a standard two-equation kappa-epsilon turbulence model was used to predict corresponding flow situations and to compare results with the experimental data.

21454 (NASA-TM—82845) **Evaluation of inelastic constitutive models for nonlinear structural analysis.** Kaufman, A. (National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center). 1982. 22p. (E—1215). NTIS, PC A02/MF A01.

The influence of inelastic material models on computed stress-strain states, and therefore predicted lives, was studied for thermomechanically loaded structures. Nonlinear structural analyses were performed on a fatigue specimen which had been subjected to thermal cycling in fluidized beds and on a mechanically load cycled benchmark notch specimen. Four incremental plasticity creep models (isotropic, kinematic, combined isotropic kinematic, combined plus transient creep) were exercised using the MARC program. Of the plasticity models, kinematic hardening gave results most consistent with experimental observations. Life predictions using the computed strain histories at the critical location with a strainrange partitioning approach considerably overpredicted the crack initiation life of the thermal fatigue specimen.

21455 (NASA-TM—82846) **Nonlinear structural and life analyses of a combustor liner.** Moreno, V. (Pratt and Whitney Aircraft Group, East Hartford, Conn.); Meyers, G.J. (Pratt and Whitney Aircraft Group, East Hartford, Conn.); Kaufman, A. (National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center). 1982. 23p. (E—1216). NTIS, PC A02/MF A01.

Three dimensional, nonlinear finite element structural analyses were performed for a simulated combustor liner specimen to assess the capability of nonlinear analyses using classical inelastic material models to represent the thermoplastic creep response of the one half scale component. Results indicate continued cyclic hardening and ratcheting while experimental data suggested a stable stress strain response after only a few loading cycles. The computed stress strain history at the critical location was put into two life prediction methods, strainrange partitioning and a Pratt and Whitney combustor life prediction method to evaluate their ability to predict cyclic crack initiation. It is found that the life prediction analyses over predicted the observed cyclic crack initiation life.

21456 **(PB—82-229667) Individual burner fuel/air ratio control optical adaptive feedback control system. Final report.** Beer, J.M.; Jacques, M.T.; Teare, J.D. (Massachusetts Inst. of Tech., Cambridge (USA). Energy Lab.). Jan 1982. 77p. NTIS, PC A05/MF A01.

Conventional combustion control systems for multiburner installations which rely on monitoring the average CO_2 and/or O_2 content of the gases have a number of inherent limitations on their ability to maintain efficient plant operation. Air infiltration into the flue or sampling lines has the same effect as an instrumental error in causing the control system to adjust the stoichiometry to an incorrect level. Even when the overall stoichiometry of the furnace is correctly and accurately controlled it is still extremely difficult to ensure that no individual burners are operating inefficiently due to local maldistributions of air or fuel, or to poor nozzle spray characteristics. The potential for fuel savings and for improved limitation of pollutant emissions has provided strong incentive for the development of individual burner fuel/air ratio control systems which would eliminate the shortcomings associated with the global control method. The present report first reviews past attempts to identify some unique property of an individual flame which can be reliably interpreted as an indicator of the flame behavior over a wide range of operating conditions. Information potentially usable in this manner could be contained in the acoustic characteristics of the flame, in the local distribution of key chemical species, or in the electromagnetic radiation or absorption behavior of regions of the flame.

21457 **(PB—82-229758) Thirty-day field tests of industrial boilers: site 5 - gas-fired low-Nox burner. Final report Mar 79-Mar 80.** Carter, W.A.; Buening, H.J. (KVB, Inc., Minneapolis, MN (USA)). May 1981. 162p. NTIS, PC A08/MF A01.

This is a final report on a test program to evaluate the long-term effectiveness of combustion modifications on industrial boilers. During previous programs, short-term tests were performed on industrial boilers to determine the effect of combustion modifications on air pollutant emissions such as NOx, SOx, CO, HC, and particulates. The objective of this program was to determine if the combustion modification techniques which were effective for short-duration tests are feasible for a longer period. The report gives results of a 30-day field test of a 24.9 MW (85,000 lb steam/hr) water tube boiler with low-NOx burners. The 30-day test was conducted with the unit firing natural gas. The mean NO emission level was 33 ng/J with a geometric dispersion of 1.12 at the high load condition.

21458 **(PB—82-229766) Thirty-day field tests of industrial boilers: site 6 - gas-fired fire-tube boiler. Final report mar 79-mar 80.** Carter, W.A.; Buening, H.J. (KVB, Inc., Minneapolis, MN (USA)). May 1981. 168p. NTIS, PC A08/MF A01.

This is a final report on a test program to evaluate the long-term effectiveness of combustion modifications on industrial boilers. During previous programs, short-term tests were performed on industrial boilers to determine the effect of combustion modifications on air pollutant emissions such as NOx, SOx, CO, HC, and particulates. The objective of this program was to determine if combustion modification techniques which were effective for short-duration tests are feasible for a longer period. The report gives results of a long-duration field test of a 200-hp fire-tube boiler using low excess air as the NOx control technology. The field test was conducted with the unit firing natural gas and with the normal duty cycle. The mean NO level for the 24-day test was 29.5 ng/J with a geometric dispersion of 1.05.

21459 **(PB—82-230715) Effects of fuel properties and atomization parameters on Nox control for heavy liquid fuel fired package boilers. Final report Jan 77-Jan 79.** England, G.C.; Pershing, D.W.; Heap, M.P.; Cichanowicz, J.E. (Energy and Environmental Research Corp., Santa Ana, CA (USA)). Apr 1982. 450p. NTIS, PC A19/MF A01.

The report gives information necessary for development and generalization of low-NOx oil burner technology for package fire-tube boilers. It gives results of experiments at two scales: 20 kW and 1.08 MW heat input. At 20 kW, effects of fuel properties were examined in tests of 3 distillate oils, 13 petroleum-derived residual fuel oils, 3 alternate liquid fuels, and 14 doped and/or blended liquid fuels. The tests included systematic variation of excess air and drop size distribution, normal and staged combustion conditions, and separation of fuel NOx from total NOx. At 1.08 MW, experiments concentrated on the interaction between spray characteristics and the combustion aerodynamic flowfield. Spray characteristics were varied by using different commercial atomizing nozzles and by adjusting nozzle operating conditions. Combustion flowfield was varied by modifying the swirl level on the combustion air.

21460 **(PB—82-231077) Industrial boiler combustion modification Nox controls. Volume I: environmental assessment. Final report Jan 78-Jul 79.** Lim, K.J.; Castaldini, C.; Lips, H.P. (Acurex Corp., Mountain View, CA (USA). Energy and Environmental Div.). Jul 1981. 393p. NTIS, PC A17/MF A01.

The report gives results of an environmental assessment of combustion modification techniques for coal-, oil-, and gas-fired industrial boilers, with respect to NOx control reduction effectiveness, operational impact, thermal efficiency impact, capital and annualized operating costs, and effect on emissions of pollutants other than NOx. Major industrial boiler design types and equipment trends are reviewed. Currently available control techniques can reduce NOx 10-25% for coal- and residual-oil-fired boilers, and 40-70% for distillate-oil- and gas-fired units with minimal adverse operating impacts. Controls should increase steam costs by only 1-2%, but the initial investment required could be significant, up to 20% on a new boiler and easily up to 40% on a retrofit. Detailed Level 1 tests on two stoker-coal-fired boilers indicate that combustion modification reduces the potential environmental hazard of the source by lowering NOx emissions, without significant effect on the emissions of other pollutants.

21461 **(PB—82-231085) Industrial boiler combustion modification Nox controls. Volume II: stoker-coal-fired boiler field test - Site A. Final report Jul 78-Jul 79.** Goldberg, P.M.; Higginbotham, E.B. (Acurex Corp., Mountain View, CA (USA). Energy and Environmental Div.). Jul 1981. 182p. NTIS, PC A09/MF A01.

The report gives methods and results of an environmental assessment test program at an industrial site. The aim of the program was to measure multimedia emissions changes as a result of applying NOx controls. Emissions of trace elements, organic materials, sulfur species, SO_2, NOx, CO, and particulate matter were measured. These emissions, under normal and controlled (for NOx) operating conditions, were compared. Source operating data were also analyzed so that changes in operating parameters and efficiency could be assessed. This unit is a spreader-stoker coal-fired boiler rated at 38 kg/s (300,000 lb/hr) of steam. The fuel tested was low-sulfur coal. High overfire air firing (constant overall air flow) was used for NOx control. These measures reduced NOx by about 10% from baseline. Increased overfire air levels also improved boiler efficiency. These tests lasted about 5 hours; long-term operation under test conditions was not addressed in this program. Test results suggest that applying combustion modification NOx controls increased particulate and organic emissions.

21462 **(PB—82-231093) Industrial boiler combustion modification Nox controls. Volume III: stoker-coal-fired boiler field test - Site B. Final report Jul 78-Jul 79.** Lips, H.I.; Higginbotham, E.B. (Acurex Corp., Mountain View, CA (USA). Energy and Environmental Div.). Jul 1981. 205p. NTIS, PC A10/MF A01.

The report gives methods and results of an environmental assessment test program at an industrial site. The aim of the program was to measure multimedia emissions changes as a result of applying NOx controls. Emissions of trace elements, organic materials, sulfur species, SO2, NOx, CO, and particulate matter were measured. These emissions, under normal and controlled (for NOx) were compared. Test results show that applying combustion modification NOx controls did not affect total particulate emissions from ESP outlet or sulfur species emissions. Some changes in trace element partitioning occurred with the application of NOx controls. Bioassays of ash samples for LEA operation had low or nondetectable toxicity/mutagenicity.

21463 **(PB—82-240185) Technology overview: circulating fluidized-bed combustion. Final report.** Roeck, D.R. (GCA Corp., Bedford, MA (USA). GCA Technology Div.). Jun 1982. 62p. NTIS, PC A04/MF A01.

The report summarizes the current technical status of circulating fluidized-bed combustion (CFBC). Companies that are involved in investigating this technology and/or developing commercial systems are discussed, along with system descriptions and available cost information. CFBC is a second-generation FBC system that is well underway toward commercialization in the U.S. The CFB operates at higher fluidization velocity, lower mean bed particle size, and higher recirculation rate than conventional FBC. Probable advantages of CFBC over traditional FBC include: more flexibility in fuel selection, reduced number of fuel feed points, higher combustion efficiency, better calcium utilization, and lower NOx emissions. Potential process limitations that must still be evaluated, however, include equipment erosion due to the more severe operating conditions, separation of bed material from effluent gas, severity of cyclone separation equipment design, and power requirements for process and auxiliary equipment operation. Battelle Development, Lurgi, and Pyropower are the major companies involved in demonstrating the commercial viability of this process in the U.S. Lurgi and Pyropower are basing their CFB systems on technology already commercially demonstrated in Europe; after pilot-proving its process, Battelle is building the first commercial U.S. plant.

4220 Underground Engineering

REFER ALSO TO CITATION(S) 19613

21464 **(SAND—82-0599) Development of an ice-penetration model.** Hightower, M.M.; Norwood, F.R.; Young, C.W. (Sandia National Labs., Albuquerque, NM (USA)). Dec 1982. Contract AC04-76DP00789. 46p. NTIS, PC A03/MF A01. Order Number DE83007316.

In May 1981, Sandia National Laboratories and the United States Naval Surface Weapons Center (NSWC), Silver Sprngs, Maryland, established a program to evaluate various analytcal methods to predict penetrator motion during normal impact into ice. To accomplish this, a constitutive equation for ice was deduced from existing material property data and an ice penetration model was developed. This model was used to calculate penetrator performance and loading for several ice penetration tests. These calculations were then compared to the experimental data.

4230 Marine Engineering

21465 **(AD-A—115462/4) Flow-induced oscillations of OTEC mooring and anchoring cables: state of the art. Final report.** Griffin, O.M. (Naval Research Lab., Washington, DC (USA)). 27 May 1982. 88p. (NRL-MR—4766). NTIS, PC A05/MF A01.

The objective of this report is to present an overview of the state of knowledge concerned with marine cable strumming oscillations and to apply these finding of the development of design methods for deep ocean cable systems. The report emphasizes recent findings that are relevant to the design of OTEC power plant mooring and riser cable systems. This report is limited in scope to the problems caused by vortex shedding from bluff, flexible structures and cables in steady currents, and the resulting vortex-excited oscillations. Emphasis is placed on outlining the important aspects of the basic phenomena, the development of design procedures, the definition of hydrodynamic force coefficients applicable in practice, and the specification of structural response parameters relevant to marine cable system design.

4240 Pollution Control Equipment

REFER ALSO TO CITATION(S) 19434, 19588, 19593, 20305, 21457, 21458, 21459, 21460, 21461, 21462, 21704, 21757, 21790

21466 **(PB—82-227356) Regulatory impact analysis of the national ambient air quality standards for carbon monoxide. Final report.** Henning, B. (Energy and Environmental Analysis, Inc., Arlington, VA (USA)). 2 Apr 1980. 189p. NTIS, PC A09/MF A01.

This report presents economic impact information for alternative eight-hour carbon monoxide national ambient air quality standards. The alternatives are 7 ppm, 9 ppm, and 12 ppm (on a daily maximum basis, where the highest eight-hour average for a day is used to determine if the expected number of exceedances of the standard is less than or equal to one per year). An Urban and Community Impact standard is included as part of the report. Cost and economic impacts of CO emission controls on selected industries were investigated. The analyses included capital and annualized control costs, availability of financial capital for control requirements, and potential product price and output impacts.

21467 **(PML—1980-77) Porous polymers as new sorptive materials.** Medema, J.; Vanbokhoven, J.J.G.M. (Prins Maurits Lab. TNO, Rijswijk (Netherlands)). Oct 1980. 18p. NTIS, PC A02/MF A01.

Porous polymers are compared with active carbon for the adsorption of harmful compounds from the atmosphere. Factors determining the character of porous polymers are discussed, and results regarding adsorption capacity is described. Literature data and adsorption tests were used. The main factors which characterize the polymer are solvent type and degree of crosslinking. Active groups do not influence the physical adsorption capapcity very much. Water vapor adsorption on porous polymers is extremly low. The rate of adsorption on a good porous polymer is considerably lower than the rate of adsorption into active carbon. (ESA)

21468 **Parameters influencing the collection efficiency of solid aerosols in cascade impactor.** Boulaud, D.; Diouri, M.; Madelaine, G. pp vp of Aerosols in science, medicine and technology. Stoeber, W.; Hochrainer, D. (eds.). Bad Soden, Germany; Gesellschaft fuer Aerosolforschung e.V. (1981).

From Conference on aerosols in science and technology - aerosols in and from in and from industrial processes; Duisburg, F.R. Germany (23 Sep 1981).

The calibration of the Mark II ANDERSEN impactor brought out the following conclusions: The nature of the collection surface is very important. The parasitic effects of particles bounce and blow-off are reduced by using grease coated plates. The aerosol mass previously deposited on the collection plates are also very important. Collection efficiency curves are slightly modified when the mass loading reach 5 mg but this modification remains acceptable until 40 mg. The electrostatic effect is weak when the number of charges is below 1000 by particles. In optimal conditions sharp cut-off was obtained for all stages. The comparison between theoretical and experimental results shows that they are in good agreement (except for the first stage).

21469 **Bipolar current probe and its application in electrostatic precipitators for diagnosis of back discharge severity.** Masuda, S. pp vp of Aerosols in science, medicine and technology. Stoeber, W.; Hochrainer, D. (eds.). Bad Soden, Germany; Gesellschaft fuer Aerosolforschung e.V. (1981).

From Conference on aerosols in science and technology - aerosols in and from in and from industrial processes; Duisburg, F.R. Germany (23 Sep 1981).

As the parameters of expressing the severity of back discharge, the degraded value of the field intensity, E, and the positive and negative ionic current densities, J+ and J-, are proposed, based on the charging and charge-neutralization processes in the bi-ionized field. Then, a bipolar current probe for measuring J+ and J- is described with its probe theory and some of the measuring results. Finally, the experimental verifications of the relationships holding between the charge and performance degradation factors and the probe-measured values of J+ and J- are presented. Although the laboratory results cannot immediately be extended to the practical plants, the bipolar current probe seems to provide one of the useful means for diagnosis of back discharge severity.

21470 **Equivalence of low pressure impactor and differential mobility analyzer data for submicron particle size distributions.** Reischl, G.P. pp vp of Aerosols in science, medicine and technology. Stoeber, W.; Hochrainer, D. (eds.). Bad Soden, Germany; Gesellschaft fuer Aerosolforschung e.V. (1981).

From Conference on aerosols in science and technology - aerosols in and from in and from industrial processes; Duisburg, F.R. Germany (23 Sep 1981).

4250 Power Cycles

REFER ALSO TO CITATION(S) 20269, 21014

21471 (EUR—7159-EN) **Experimental Rankine cycle engine designed for heat recovery from exhaust gases of industrial plants.** Cipolla, G. (Commission of the European Communities, Luxembourg). 1981. 233p. Available from the Commission of the European Communities, Luxembourg.

This report describes the development of, and the results obtained from, an Organic Research Cycle (ORC) engine in order to assess its feasibility; the subject research program is the extention of the activities carried out in the frame of the previous EC Contract n° 196-76 EEi. In particular the following activities have been carried out: - engine and test rig desing and set up - working fluid and thermodynamic cycle choice - engine performance and mechanical behaviour evaluation - laboratory investigation on chemical compatibility and thermal stability of the candidate working fluids. Engine performance has been evaluated using two different fluids: Freon 11 and perfluorohexane. The main results of the experimental investigation performed are: - engine performance in good agreement with the calculated values - mechanical behaviour of main components almost satisfactory - working fluid problems: Freon 11 in fact has proved not to be completely reliable in the higher temperatures range, but very interesting from the performance point of view. Perfluorohexane, on the other hand, has shown very good stability up to 250°C, but it isn't fit for a simple non-regenerative cycle engine and very expansive.

43 PARTICLE ACCELERATORS

4301 Design, Development, And Operation

REFER ALSO TO CITATION(S) 21381, 21444, 21648

21472 (BNL—32531) **Laser-driven grating linac.** Palmer, R.B. (Brookhaven National Lab., Upton, NY (USA)). 1982. Contract AC02-76CH00016. 18p. (CONF-820980—5). NTIS, PC A02/MF A01. Order Number DE83007389.

From European Committee of future accelerators - the challenge of ultra-high energies conference; Oxford, UK (27 Sep 1982).

I would like to consider a 50 TeV on 50 TeV collider. Even a hadron machine with such an energy seems unrealistic with current technology. Magnetic fields higher than 10 Tesla are difficult and at this field the circumference would be 120 km. I conclude that only a high gradient Linac could be practical and that one should aim for 10 GeV/meter so as to keep the total length down to the order ot 10 km. Currently it is only plausible to obtain such fields using the very high energy densities produced by lasers. The luminosity is another issue. I aim for 10^{33} to 10^{34} but I am conscious that higher luminosities than even these are really desired, especially for an e^+e^- machine. I tend to assume that the machine is an e^+e^- machine but it will also accept hadrons.

21473 (CONF-8010206—Vol.1, pp 23-31) **Industrial and medicine accelerators and prospects of their development in the 11 five year plan.** Vakhrushin, Yu.P.; Glukhikh, V.A.; Svin'in, M.P. (Nauchno-Issledovatel'skij Inst. Ehlektrofizicheskoj Apparatury, Leningrad (USSR)). 1981. (In Russian). Joint Inst. for Nuclear Research, Dubna, USSR.

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

The data on development and introduction of accelerators into industry and medicine, improvement of their technical-and-economic factors are presented. A parametric series of high-voltage electron accelerators which includes seven models covering the 0.15-4 MeV energy range, is developed. A common series of linear resonance accelerators for non-destructive testing, radio-therapy, activation analysis and radiation technology cover the 3-40 MeV electron energy range. The series includes 12 modifications of accelerators made of unified modules. A linear induction accelerator with up to 200 kW average beam power for using in an installation for liquid waste decontamination is under development. A parametric series of cyclotrons for industry and medicine using electron beams at 6-220 MeV energy and up to 200 μA current is developed.

21474 (FERMILAB-CONF—82/77-THY) **Remarks on future accelerators and future physics.** Bjorken, J.D. (Fermi National Accelerator Lab., Batavia, IL (USA)). Sep 1982. Contract AC02-76CH03000. 9p. (CONF-820980—4). NTIS, PC A02/MF A01. Order Number DE83006643.

From European Committee of future accelerators - the challenge of ultra-high energies conference; Oxford, UK (27 Sep 1982).

Speculations are given on the future of high energy accelerators. (GHT)

21475 (LA—9572-C-Vol.2, pp 552-559) **Muon storage ring for LAMPF II.** Neuffer, D. (Fermilab, Batavia, IL). Nov 1982. NTIS, PC A17/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

A muon storage ring is suggested as a possible tool in search for neutrino oscillations at LAMPF II. The same system can also be used for precision nu-interaction measurements and for anti p accumulation. Parameters of a sample system are described.

21476 (LA—9572-C-Vol.2, pp 619-642) **Physics with intense antiproton beams.** Kalogeropoulos, T. (Syracuse Univ., NY). Nov 1982. NTIS, PC A17/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

The discussion considers two types of beams, time separated (TSB) and cooled beams of antiprotons. Two TSB beams are considered for LAMPF II, stopping, and low and medium energy. The relative costs are considered. The standard nucleon-antinucleon research programs include: atomic captures; baryonium; phase shifts; final state interactions; and nuclear. The non-standard program includes: EM interactions; charm; proton form factor in the time-like region; two-photon physics; 1-2 GeV spectroscopy; tagged beams of π^0, K, lambda, anti lambda for weak interaction experiments; π^0, K^+, K^-, K^0 tagged beams; symmetric lambda, anti lambda tagging; antineutron tagged beams; antideuterons; and biomedical applications. (GHT)

21477 (SAND—82-2900C) **High-average-power electron accelerators for generating gigawatt microwave pulses.** Prestwich, K.R.; Rohwein, G.J. (Sandia National Labs., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 9p. (CONF-830314—1). NTIS, PC A02/MF A01. Order Number DE83006808.

From 2. national conference on high power microwave technology; Adelphi, MD, USA (1 Mar 1983).

High power, relativistic electron beams can be efficiently converted to microwaves. A conceptual design of a portable 700 kV, 10 kA, 100 ns, 100 Hz electron beam accelerator that could be the energy source for a relativistic magnetron or backward wave oscillator is described. The design consists of a capacitor, a compact, high-voltage transformer, a PFN, spark gaps, and an electron beam diode. A brief description is given of prime power systems suitable for powering such a device.

21478 (SLAC-PUB—2954) **Future of electron colliders.** Richter, B. (Stanford Linear Accelerator Center, CA (USA)). Jul 1982. Contract AC03-76SF00515. 5p. (CONF-820718—31). NTIS, PC A02/MF A01. Order Number DE83007016.

From 21. international conference on high energy physics; Paris, France (29 Jul 1982).

Future electron accelerators for energies in the TeV range are discussed. Alternative accelerator types are considered. (GHT)

21479 (SLAC-PUB—3004) **Future of electron-positron colliders.** Richter, B. (Stanford Linear Accelerator Center, CA (USA)). Oct 1982. Contract AC03-76SF00515. 6p. (CONF-8206116—21). NTIS, PC A02/MF A01. Order Number DE83007015.

From DPF summer study on elementary particle physics and future facilities; Aspen, CO, USA (28 Jun 1982).

This paper is an abbreviated version of a lecture given at the Snowmass meeting of the Division of Particles and fields of the APS. Included here are SLAC's plans for the Stanford Linear Collider and my own speculation on the development of the e^+e^- machines beyond the SLC or LEP that well be required to further advance the state of particle physics.

4302 Beam Dynamics, Field Calculations, And Ion Optics

REFER ALSO TO CITATION(S) 21528, 21553, 21554, 21555, 21559, 22632

21480 (AD-A—117975/3) **KMRAD: a linearized particle code for the study of resistive instabilities. Final technical report.** Hughes, T.P.; Godfrey, B.B. (Mission Research Corp., Albuquerque, NM (USA)). May 1982. 29p. NTIS, PC A03/MF A01.

A linearized electromagnetic particle simulation code KMRAD has been developed to look at resistive instabilities on electron beams. The code can simulate three-dimensional dynamics, but by use of Fourier transforms in two directions, only one spatial direction needs to be resolved. For cold beam equilibria, KMRAD predicts growth rates which closely agree with those obtained from an exact cold-fluid code. For a Bennett equilibrium, comparisons between KMRAD and available analytic models are presented, and several discrepancies are noted.

21481 (AD-A—118056/1) **Resistive wall instabilities in the modified betatron. Revision 1. Interim report.** Godfrey, B.B.; Hughes, T.P. (Mission Research Corp., Albuquerque, NM (USA)). Apr 1982. 13p. NTIS, PC A02/MF A01.

Resistive wall instabilities in modified betatrons are analyzed in several limits. The moderate frequency, negative energy, $m=1$ spacecharge and cyclotron waves are found to be most dangerous, potentially capable of disrupting acceleration for typical betatrons parameters. A moderate spread in electron energy can, however, stabilize these modes.

21482 (AD-A—119869/6) **Equilibrium of a high current electron ring in a modified betatron accelerator. Memorandum report.** Kapetanakos, C.A.; Sprangle, P.; Chernin, D.P.; Marsh, S.J.; Haber, I. (Naval Research Lab., Washington, DC (USA)). 30 Sep 1982. 72p. (NRL-MR—4905). NTIS, PC A04/MF A01.

This paper addresses the dynamics of an ultra-high current electron ring in a modified betatron configuration. Our studies include analytical and numerical results for both 'cold' and 'hot' rings. It has been found that the walls surrounding the ring and toroidal effects (hoop stresses) play a very important role in the dynamics of the ring, even when the wall conductivity is infinite. For finite wall conductivity, the diffusion of the ring's self magnetic field profoundly impacts its dynamics in general the equilibrium could be lost if means are not provided to compensate for this effect. In addition, it has been found that the Grad B drift is not important, except when the bounce frequency is very small. The general conclusion of these studies is that equilibrium states of ultra-high current rings in a modified betatron configuration exist over a wide range of parameters. These states are accessible and within the realm of existing pulsed power technology.

21483 (ANL/NESC—944) **SATDSK; saturated iron magnetic field study.** McNeilly, G.S. (Oak Ridge National Lab., TN (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048944.

Maxima of - 1001 points in the poletip arrays 100 poletip gap steps 17 magnetic charge disks Magnetic fields are calculated only in the median plane for median-plane-symmetric iron poletips.

SATDSK is designed to calculate the median plane magnetic field in superconducting cyclotrons due to fully saturated iron poletips. Optionally, the program calculates the magnetic field due to disks of magnetic "charge", which can simulate the effect of holes in the iron poletips or circular trim rods embedded in the poletip. SATDSK is intended for poletip geometries that are both symmetric about the median plane and have azimuthal sector symmetry.IBM360,370,303x; FORTRAN IV (89%) and Assembly language (11%); OS/MVT, OS/MVS; 165K bytes of memory are required to execute the program.

21484 (BNL—32546) **Higher-order modes calculation of rf cavity with cylindrical symmetry.** Zhou, W.; Xuanwen, C.; Mingda, Z. (Brookhaven National Lab., Upton, NY (USA); Zhejiang Univ., Hangzhou (China)). 1983. Contract AC02-76CH00016. 4p. (CONF-830311—4). NTIS, PC A02/MF A01. Order Number DE83007394.

From Particle accelerator conference; Santa Fe, NM, USA (21 Mar 1983).

This paper represents a new computer calculating method for cylindrical symmetry cavities. This method can calculate not only the fundamental mode and longitudinal modes but also the transverse higher modes. The Hertz vector is used as fundamental quantity and the separated variable method is applied. An empty cylindrical cavity has been calculated. The calculating result is in accord with analytic solution fairly well.

21485 (BNL—51610) **Effects of magnetic non-linearities on a stored proton beam and their implications for superconducting storage rings.** Cornacchia, M.; Evans, L. (Brookhaven National Lab., Upton, NY (USA)). 7 Oct 1982. Contract AC02-76CH00016. 40p. NTIS, PC A03/MF A01. Order Number DE83008471.

In this report we describe an experiment which was conducted at the SPS to observe the combined effects of a single isolated high-order nonlinear resonance, nonlinear detuning, and tune modulation. The nonlinear resonance, as well as the nonlinear detuning, was driven by a nonlinear lens, which had been previously used at the SPS for the study of the beam-beam interactions. The nonlinear motion of a particle in the field of the lens is discussed.

21486 (CONF-8010206—Vol.1, pp 279-283) **Stochastic spreading of longitudinal phase density in proton bunch longtime confining.** Gurov, G.G. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij); Kotin, V.V. (Moskovskij Inzhenerno-Fizicheskij Inst. (USSR)). 1981. (In Russian). Joint Inst. for Nuclear Research, Dubna, USSR.

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

Proton beam spreading inside a high-frequency packet under the effect of parametric noise during durable proton bunch confinement in the synchrotron is considered. A wide-band noise, which spectrum is rather close to a nonuniform one and limited by a bandwidth of accelerating devices of the synchrotron is considered as a perturbation of the HF voltage amplitude providing a proton beam bunched structure in the circulation mode. Evolution of a longitudinal particle distribution in a bunch is studied using the Eeinstein-Fokker equation. At the 90 Hz phase oscillation frequency, 1% per minute limiting permissible loss rate and parabolic initial distribution the $1.49\text{x}10^{-5}$ Hzsup(-1/2) spectral density tolerance of parametric noise is obtained.

21487 (CONF-8010206—Vol.1, pp 331-333) **Peculiarities of magnetic field formation in a dipole magnet of the first stage of the accelerating-storage complex.** Dojnikov, N.I.; Kashikhin, V.S.; Popov, A.V.; Puzynovich, Yu.T.; Samsonov, G.N. (Nauchno-Issledovatel'skij Inst. Ehlektrofizicheskoj Apparatury, Leningrad (USSR)); Dajkovskij, A.G.; Portugalov, Yu.I. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1981. (In Russian). Joint Inst. for Nuclear Research, Dubna, USSR.

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

To ground the accuracy of the numerical methods the magnetic field of a dipole magnet of the first stage of a designing accelerating- storage facility is calculated. The choice of the magnet pole profile is based on the approximation of infinitely large permeability. The following profile modifications are considered: a rectangular and a close to rectangular with round off angles. Investigations of the magnetic field are carried out according to the different computer codes using through irregular grids (triangular and rectangular) and providing a continuous transition to the μ=infinity. It is shown that the accuracy of the numerical methods for induction varying within the 0.1-1 T range is 10^{-4}.

21488 (CONF-8010206—Vol.1, pp 217-219) **Self-consistent theory of intense beam acceleration in beam bunching sections.** Ajzatskij, N.I.; Makhnenko, L.A. (AN Ukrainskoj SSR, Kharkov. Fiziko-Tekhnicheskij Inst.)). 1981. (In Russian). Joint Inst. for Nuclear Research, Dubna, USSR.

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

The results of calculation of current loading for a relativistic electron beam accelerated in the bunching section of the LUE-300 electron linac are presented. The section is a piece of a diaphragmatic waveguide of the 80 cm length, the operating type of a travelling wave is $\pi/2$. The effect of the electron beam on its acceleration is taken into account on the basis of a self-consistent description of the particle dynamics in a field being a superposition of the external generator field and fields generated by the beam particles at the given frequency. it is shown that during beam acceleration there is some limiting value of accelerated current, equal to 2.8 A, starting from which the acceleration process becomes inefficient. A particle bunch being accelerated is strongly deformed.

21489 (CONF-8010206—Vol.1, pp 209-212) **Dynamics of positron beam from a convertor target while beam additional accelerating in a travelling wave electron linac.** Dzhilavyan, L.Z. (AN SSSR, Moscow. Inst. Yadernykh Issledovanij); Karev, A.I. (AN SSSR, Moscow. Fizicheskij Inst.). 1981. (In Russian). Joint Inst. for Nuclear Research, Dubna, USSR.

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

The results of experimental and theoretical investigations of the dynamics of a positron beam produced in a tantalum converter of the 6 mm thickness in the process of beam reacceleration in an electron linac (ELA) are presented. The mean finite positron currents and their dependences on the accelerating electric field are measured. The energy spectra of accelerated positrons are given. A good agreement between the calculated and experimental data is shown. As a result of investigations some peculiarities of positron production on the ELA intersection targets, which are defined by both the initial positron beam parameters from the converter and the dynamics of positron reacceleration in the ELA.

21490 (CONF-8010206—Vol.1, pp 220-223) **Self-consistent interaction of a set of ion extended bunches with a multigap resonator.** Vyalov, G.N.; Senichev, Yu.V. (AN SSSR, Moscow. Inst. Yadernykh Issledovanij). 1981. (In Russian). Joint Inst. for Nuclear Research, Dubna, USSR.

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

The dependence of a HF field induced by a high-current proton beam on the beam injection phase at the resonator input and on the final bunch length is numerically studied. The problem is solved for resonators of the second part of the meson factory of the Institute of Nuclear Research of the Academy of Sciences of the USSR. The four elements are considered in the model of beam interaction with the resonator, which are the following: a resonator, a beam, a HF generator and a waveguide section. The resonator is considered in a one-mode approximation. The beam was simulated in a two-dimensional longitudinal phase space. Coulomb interaction is not taken into account. The iteration method is used in calculations. It is shown that the results obtained permit to determine the effect of the vortical component of the proper field on bunch motion in the resonator, that is important for developing HF systems and systems of automation control of parameters of the accelerating field used in high-current accele-- rators.

21491 **(FERMILAB-CONF—82/65-THY) Polarized e^{+-} - polarized p colliding beams: physics issues.** Bjorken, J.D. (Fermi National Accelerator Lab., Batavia, IL (USA)). Sep 1982. Contract AC02-76CH03000. 13p. (CONF-820941—12). NTIS, PC A02/MF A01. Order Number DE83006645.

From 5. international symposium on high energy spin physics; Upton, NY, USA (16 Sep 1982).

The physics of collisions of polarized electrons with polarized protons at storage-ring energies is examined, with emphasis on polarization asymmetries of structure functions. The usefulness of positron-proton as well as electron-proton collisions is underlined.

21492 **(GSI—82-7) Derivation of an elementary RFQ formula.** Funk, L.W.; Mueller, R.W. (Gesellschaft fuer Schwerionenforschung m.b.H., Darmstadt (Germany, F.R.)). Jul 1982. 15p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83750187.

The purpose of this short note is to derive a few of the basic formulae which relate to RFQ behaviour.

21493 **(Juel—1772) Mathematical and numerical methods for the nonlinear hyperbolic propagation problem: d^2GAMMA/dt^2 = d/dz [dGAMMA/dt dGAMMA/dz].** Stanco, L.; Vaccaro, V.G.; Funk, U.; Krueger, U.; Mika, K.; Wuestefeld, G. (Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Festkoerperforschung). Mar 1982. 173p. NTIS (US Sales Only), PC A08/MF A01. Order Number DE83750195.

In the first part of this report a physical model is presented, which describes the deforming of a bunch in a storage ring influenced only by its own space charge field. A system of two differential equations for the density and the momentum of the particles is set up, which is independent of any special machine parameter. Due to the sign of the inductance of the chamber walls and the sign of the dispersion of the revolution frequency, we distinguish between a de-bunching and a self-bunching situation. The debunching corresponds to a nonlinear hyperbolic propagation problem well-known in gas dynamics, and the self-bunching to a nonlinear elliptic initial value problem. The second part deals with a mathematical and numerical treatment of an approximate equation for the hyperbolic case. For this nonlinear second order partial differential equation we first present three particular integrals: the solution by separating the variables, the similarity solution, and the solution for a parabolic initial distribution of the density. For a more realistic initial condition, we must resort to other methods: Results are obtained in three different ways, first from a highly accurate Taylor series expansion, second from a common finite difference method, and thirdly from the numerical method of characteristics. The appearance of a shock discontinuity is furthermore established in each of these cases.

21494 **(LA—9621-MS) LAMPF II main-ring lattice with low transition energy.** Garren, A. (Los Alamos National Lab., NM (USA)). Dec 1982. Contract W-7405-ENG-36. 10p. NTIS, PC A02/MF A01. Order Number DE83007099.

A main-ring lattice that avoids crossing transition energy during acceleration when injected by a low-energy booster is discussed. Included in the report are a list of parameters, plots of lattice and orbit functions, and output from program SYNCH.

21495 **(UCRL—88737) Microwave generator experiment at LLNL.** Hofer, W.W.; Burkhart S.C.; Scarpetti, R.D. (Lawrence Livermore National Lab., CA (USA)). 14 Feb 1983. Contract W-7405-ENG-48. 10p. (CONF-830314—3). NTIS, PC A02/MF A01. Order Number DE83007348.

From 2. national conference on high power microwave technology; Adelphi, MD, USA (1 Mar 1983).

A high power microwave oscillator known as a Virtual Cathode Oscillator (VIRCATOR) is described here. It is basically a space charge limited field emission cathode injecting electrons through a thin foil into a 4.3 cm radius circular waveguide. The total injected current forms a potential which exceeds the electron energy at which point a virtual cathode forms, and the electrons are reflected back across the foil. This occurs cyclically, coupling energy into TM/sub on/ waveguide modes. The frequency and power of the oscillations are very dependent on geometry and driving voltage. The VIRCATOR is presented here in two parts. First, the VIRCATOR theory and experiment setup is discussed, then numerical analysis of various VIRCATOR geometries is shown.

21496 **Bunch diffusion due to rf noise.** Krinsky, S.; Wang, J.M. (Brookhaven National Lab., Upton, NY (USA)). *Particle Accelerators;* **12**: No. 2, 107-117(Jul 1982).

A treatment of the influence of rf noise on a proton bunch valid for an arbitrary rf potential is presented. The approach is based upon the Hamilton-Jacobi transformation, followed by an application of canonical perturbation theory. A general proof is presented for the relation $A_1 = 1/2$deltaA$_2$/deltaJ, recently considered by Boussard, Dome and Graziani (Proc. X1th international conf. on High Energy Accelerators, Geneva, 1980, p620.). Some properties of the solutions of the Fokker-Planck equation describing the diffusion of small bunches are considered.

21497 **(CAPE—2711) Prebuncher-main injector assembly (single electron gun) (Engineering Materials).** (591 0000). [nd]. Contract AC03-76SF00515. TIC. Order Number DE83006001.

This drawing set supplies drawings and specifications for the construction and installation of the prebuncher used on the SLAC 3-kilometer linear accelerator. The prebuncher is an rf-driven cavity which bunches the electron stream emanating from the electron gun and is located between the gun and the main injector accelerator section where the remaining bunching is accomplished. The prebuncher is capable of bunching 75% of the charge into bunches of 100 electrical degrees or 60% of the charge into bunches of 60 electrical degrees at 2856 MHz.

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REFER ALSO TO CITATION(S) 21339, 21340, 21376, 21377, 21388, 21484, 21552, 21573, 21575, 21649, 22248, 22249

21498 **(ANL—83-13-Add.) Conceptual design of a rapid-cycling synchrotron for the KFA-Juelich spallation neutron source: working papers.** (Argonne National Lab., IL (USA)). Jan 1983. Contract W-31-109-ENG-38. 444p. NTIS, PC A19/MF A01. Order Number DE83007899.

An accelerator group was established at ANL by the request of KFA-Juelich to carry out a conceptual design study and cost estimate for a rapid-cycling synchrotron as a possible first stage program on spallation neutron sources at KFA-Juelich. This set of notes is the individual notes which form the basis of the final report under this proposal prepared in January 1983. The topics covered include: SNQ Synchrotron Lattice-I; injection and extraction orbit; extraction from SNQ-SRA; SRA injection; capture and acceleration considerations in the SNQ-SRA; longitudinal coupling impedance; power supplies for SNQ synchrotron proposals; space charge limits in the SNQ-SRA; error analysis; SNQ-SRA ring magnets preliminary designs and cost; summary of CERN booster 4-ring arrangement; V-lattices for SNQ-SRA and extraction from the V-lattices; rf parameters for capture, acceleration and extraction; some parameters of the SNQ-SRA injector system; Keil-Schnell criterion; risetime of longitudinal resistive wall instability; beam scrapers; a design of the vacuum system; some aspects of vacuum consideration for SNQ-SRA; choice working points; ring magnet power supplies for shaped extaction of 1.1 GeV SNQ; ring magnet design and costs; tune shift due to the fringing field of the quadrupoles; coherent instability due to ions in the residual gas; transverse stabilization of bunched beams; rf acceleration system; injection into the SRA; Landau damping to get transverse stability; chromaticity and amplitude dependent tune controls in the SNQ-SRA; conversion of the SNQ-SRA to a compressor ring; comments on beam loss; summary of longitudinal stability study and transverse stability study for the SNQ-SRA; and the beam stay clear regions of the SNQ-SRA. (GHT)

21499 **(BNL—32344) Improved four-stage accel-decel production of low-energy stripped heavy ions.** Thieberger, P.; Barrette, J.; Johnson, B.M.; Jones, K.W.; Meron, M.; Wegner, H.E. (Brookhaven National Lab., Upton, NY (USA)). 1982. Contract AC02-76CH00016. 3p. (CONF-821123—36). NTIS, PC A02. Order Number DE83005791.

From 7. conference on the application of accelerators in research and industry; Denton, TX, USA (8 Nov 1982).

The two model MP Tandem Van de Graaff accelerators at Brookhaven have been used in a four-stage accel-decel configuration to produce highly stripped low energy heavy ions. The performance in this mode of operation has now been substantially improved by modifications of the second accelerator. The inclined field acceleration tube electrodes at the exit of this accelerator were replaced by straight electrodes, the vacuum was improved and the maximum negative terminal potential was increased. Higher intensity beams of heavier highly stripped ions can now be produced at lower energies than before.

21500 **(BNL—32559) Status reports on ISABELLE magnets.** Palmer, R.B.; Baggett, N.; Dahl, P.F. (Brookhaven National Lab., Upton, NY (USA)). 1982. Contract AC02-76CH00016. 6p. (CONF-821108—22). NTIS, PC A02/MF A01. Order Number DE83007386.

From Applied superconductivity conference; Knoxville, TN, USA (30 Nov 1982).

The design of the ISABELLE Palmer magnets is described. The performance of thirteen such magnets is reported. Average quench fields of 55 kG at 4.5°K have been obtained with essentially no training. The magnets can be shown to be limited only by the short sample characteristics of the cable. Required field quality was achieved in the last four magnets.

21501 **(CONF-810314—175) Development of superconducting resonators for the Argonne heavy-ion linac.** Shepard, K.W. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 4p. NTIS, PC A02/MF A01. Order Number DE83007798.

From Particle accelerator conference; Washington, DC, USA (11 Mar 1981).

Recent developments include a method for conditioning resonators which has produced a significant increase in accelerating gradient and also a design for a split-ring resonator with an optimum particle velocity of 0.16 c. Results of using a 1500 watt rf source to condition superconducting split-ring resonators are described. By repetitively pulsing for a few msec to field levels as high as an 8 MV/m effective accelerating field E/sub a/, electron loading at high field levels has been substantially reduced. After such conditioning, continuous operation at E/sub a/ > 6 MV/m, corresponding to a peak surface electric field of 30 MV/m, has been obtained. A split-ring resonator designed for an optimum particle velocity $\beta = v/c = 0.16$ is also described. The 145.5 MHz resonator is contained in the same 16 inch diameter, 14 inch length housing used for the $\beta = 0.1$ Argonne split-ring. In design of the split ring element, a 20% reduction in peak surface electric field has been achieved with no significant increase in surface magnetic field.

21502 **(CONF-810835—47) Cooling the ANL SC heavy-ion linac with two refrigerators in parallel. Preprint Paper G-26.** Nixon, J.M.; Bollinger, L.M. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 9p. NTIS, PC A02/MF A01. Order Number DE83007932.

From 1981 cryogenic engineering conference; San Diego, CA, USA (10 Aug 1981).

The Argonne Superconducting Heavy-Ion Linac consists of a series of niobium accelerating resonators grouped in cryostats. The resonators are cooled by a forced-circulation flow of liquid helium directly from a CTI Model 1400 refrigerator through a low-loss distribution line. Helium entering each cryostat is condensed to near liquid saturation by heat exchange with the colder, lower pressure return stream. As more resonators and cryostats have been added to the linac over the past few years, it has been necessary to increase the cooling capacity of the system without increasing the flow of helium through the outgoing primary side of the distribution line and the resonators. This has been accomplished by coupling the first operational CTI Model 2800 turbo-expander refrigerator in parallel with the Model 1400 in such a way as to avoid major modifications in the helium distribution system.

21503 (CONF-810987—2) **Materials Science Division HVEM-Tandem Facility at Argonne National Laboratory.** Taylor, A. (Argonne National Lab., IL (USA)). Oct 1981. Contract W-31-109-ENG-38. 20p. NTIS, PC A02/MF A01. Order Number DE83007852.

From 29. midwest solid state conference; Chicago, IL, USA (24 Sep 1981).

The ANL-Materials Science Division High Voltage Electron Microscope-Tandem Facility is a unique national research facility available to scientists from industry, universities, and other national laboratories, following a peer evaluation of their research proposals by the Facility Steering Committee. The principal equipment consists of a Kratos EM7 1.2-MV high voltage electron microscope, a 300-kV Texas Nuclear ion accelerator, and a National Electrostatics 2-MV Tandem accelerator. Ions from both accelerators are transmitted into the electron microscope through the ion-beam interface. Recent work at the facility is summarized.

21504 (CONF-820935—8) **Pulsed neutrons: one year of experience with the new source at Argonne National Laboratory.** Lander, G.H. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 24p. NTIS, PC A02/MF A01. Order Number DE83007736.

From 6. Yamada conference on neutron scattering of condensed matter; Tokyo, Japan (1 Sep 1982).

The Intense Pulsed Neutron Source (IPNS) at Argonne National Laboratory is a spallation neutron source based on a 500-MeV proton accelerator operating at 30 Hz and with an average proton current of ~ 10 μA. Neutron-scattering instruments for elastic scattering include two powder diffractometers, a single-crystal diffractometer based on the Laue method and employing a large (30 x 30 cm) position-sensitive scintillation detector, a small-angle diffractometer using a position-sensitive detector, and a polarized-neutron diffractometer which will utilize the spin-refrigerator device to obtain a beam of white polarized neutrons. For inelastic scattering, we presently have the crystal-analyzer spectrometer and two chopper spectrometers capable of providing monoenergetic incident neutron beams of between 100 and 600 MeV. From its inception IPNS has been operating in a user mode and the selection of experiments is made by a Program Committee twice a year on the basis of the scientific merit of submitted proposals.

21505 (CONF-8010206—Vol.1, pp 133-136) **Measuring the ion-stimulated desorption coefficient on a model of the vacuum chamber of the accelerating-storage complex at the temperature of 300 and 77 K.** Kalinin, Yu.Zh.; Rogozinskij, V.G.; Ushkov, V.L. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij)). 1981. (In Russian). Joint Inst. for Nuclear Research, Dubna, USSR.

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

For studying the vacuum-technical performance of a model of the vacuum chamber of the IHEP accelerating-storage facility the ion-stimulated desorption coefficient eta is measured. The vacuum chamber with the nitrogen coating of the 3.8 m length, 70 mm diameter and 1 mm wall thickness is made of the 12 Kh18N10T stainless steel. Glow discharge treatment of the chamber in argon is carried out at $2.5x10^{-2}$ mm Hg. eta is determined according to the ratio of the number of gas molecules extracted from the chamber walls into the gas phase during ion bombardment and the number of ions passed through the discharge during the same period of time. The eta dependences on the ion integral dose for different discharge voltages and eta dependences on the discharge voltage at 77 K and for two ion integral doses at 300 K are presented. It follows from the dependences that at first, at small ion doses, the eta coefficient has a relatively great value, and then it decreases and yields to the steady value with the ion dose increase at voltages > 1100 V. At 800 V and 500 V the eta value linearly decreases at doses higher than $6x10^{6}$ $ionxcm^{-2}$. At the fixed ion dose eta linearly increases with the ion energy increase. At 77 K temperature in the chamber the eta value, remaining negative, approaches zero with the increase of energy or ion integral dose.

21506 (CONF-8010206—Vol.1, pp 315-322) **Trends of development of charged particle accelerator power supply systems.** Vasil'ev, S.N.; Gusev, O.A.; Fedorov, V.D. (Nauchno-Issledovatel'skij Inst. Ehlektrofizicheskoj Apparatury, Leningrad (USSR)). 1981. (In Russian). Joint Inst. for Nuclear Research, Dubna, USSR.

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

For increasing intensity of charged particle accelerators the tendencies of development of power supply system of large proton synchrotrons of the world are considered. Statical compensators, built according to the scheme of a 3-phase ferroresonance stabilizer, providing the SPS synchrotron operation up to 500 GeV energy at a 540 MWA preset compensator power proved themselves to be good compensators of reactive power. A 12-phase .Series completely controlled circuit of a thyristor rectifier is an optimum power supply system. As a power supply system of booster ring electromagnets in the USSR, the system of active formation of a magnetic cycle using resonance discharge of capacitance and induction storage rings commutated by thyristor switches is accepted. Stabilization of the injection levels and maximum value of the magnetic field is realized by controlled thyristor transformer control. The same tendency concerns the heavy ion accelerators.

21507 (CONF-8010206—Vol.1, pp 323-326) **Problems of magnetic cycle formation in ring electromagnets of accelerating-storage complex.** Vasil'ev, S.N.; Gusev, O.A.; Gusev, G.I.; Kofman, V.M.; Lebedev, Yu.V.; Mozin, I.V.; Rozhkov, V.N.; Tunkin, A.A.; Fedorov, V.D. (Nauchno-Issledovatel'skij Inst. Ehlektrofizicheskoj Apparatury, Leningrad (USSR)). 1981. (In Russian). Joint Inst. for Nuclear Research, Dubna, USSR.

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

The charts of formation of magnetic cycles of ring electromagnets of the first and second stages of the 400/3O00 GeV accelerating-storage facility are presented. At the first stage particles of the energy up to 7O GeV are accumulated during 78.5 s. After acceleration up to 400 GeV the particles are transported into the second stage, where they are accelerated up to 3000 GeV and slow extraction during 40 s. Power supply of every ring electromagnet is provided by 24 controlled sources, constructed according to the 12-pulsed circuit on the base of 3.5 kA/1 kV thyristor bridge transformers. The introduction of the sources in turns into operation is realized by groups of 6 and then of 12 synchronously controlled sources. Magnetic cycle variations are performed smoothly at a restricted rate of variation of the power consumption of 100 MW/s. The block diagram of the voltage control device with the 10^{-4} accuracy of a power supply source is given. To restore a failed source in each of 12 power supply systems it is assumed to install a reserve thyristor module.

21508 (CONF-8010206—Vol.1, pp 327-330) **Magnetic field formation in a heavy ion synchrotron.** Vasil'ev, S.N.; Goncharenko, V.P.; Gusev, O.A.; Kan, Yu. (Nauchno-Issledovatel'skij Inst. Ehlektrofizicheskoj Apparatury, Leningrad (USSR)) . 1981. (In Russian). Joint Inst. for Nuclear Research, Dubna, USSR.

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

The principle of construction of the power supply system of the basic electromagnet of a heavy ion synchrotron are considered. The power supply system is made on the basis of a capacitance storage ring and a controlled 12-pulse thyristor transformer with a transistor-transformer transmission band stretcher connected through matching anode transformers directly to an alternating current network. The proposed power supply system permits to obtain the following current pulse parameters: the maximum current value in the booster mode is 400 A, in the slow extraction mode-3400 A, the cycle recurrent frequency is 3 Hz, the current amplitude control range is 50-120 ms; pulse duration of the flat-top during injection is 5-10 ms, the maximum rate of the field growth in the accelerating mode is 15 T/s. The electromagnet parameters are the following: the active resistance is 0.7 Ohm, the coil induction is 0.1 H. The block diagram of the automatic control system is given.

21509 (CONF-8010206—Vol.1, pp 334-337) **Results of modernization of the control and smoothing system of ITEP proton synchrotron magnetic field pulsations.** Gusev, O.A.; Gusev, G.I.; Kofman, V.M.; Rozhkov, V.N. (Nauchno-Issledovatel'skij Inst. Ehlektrofizicheskoj Apparatury, Leningrad (USSR)). 1981. (In Russian). Joint Inst. for Nuclear Research, Dubna, USSR.

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

The results of improvement of the magnetic field control system of the IHEP proton synchrotron are presented. As a result of modernization of different structures of the phase control systems, the asynchronous statical system parallel with the synchronous system, where the reference sweep voltage is the 180 deg biased voltage of the phase, which does not involve in commutation, ensures a considerable decrease of the rectified voltage pulsation subharmonics. The experiments on the accelerator modernized system have shown that on the magnetic field flat top the level of the subharmonic voltage pulsation components at the circular electromagnet poles is reduced down to 0.1-0.2 V. The magnetic field stability is increased up to 0.2 Oe.

21510 (CONF-8010206—Vol.1, pp 121-124) **Development of 5 T radiation-resistive pulse magnets.** Karasyuk, V.N.; Sil'vestrov, G.I. (AN SSSR, Novosibirsk. Inst. Yadernoj Fiziki). 1981. (In Russian). Joint Inst. for Nuclear Research, Dubna, USSR.

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

The construction and manufacturing method of pulsed dipole magnets with the 5T field are described. Oxidized aluminium and tantalum foils and asbestos cement plates are used as insulators. In this construction the current-carrying buses are rigidly fixed directly on iron of the magnetic core, and the insulators are carried from the bus surface to the magnet periphery. The first magnet of the 10 cm length (of the 1.25x2.5 cm aperture) is developed for separation of the initial proton beam at the 80 GeV/c momentum and the antiproton beam at the 4.5 GeV/c momentum in the FNAL antiproton target facility. The second magnet of the 60 cm length (of the 2x4 cm aperture) is developed for bending the π-meson beam at 66 GeV/c by 150 mrad and extraction from the IHEP neutron target facility. The results of tests on the short magnet sample and insulators are presented.

21511 (CONF-8010206—Vol.1, pp 91-94) **Beam storage for intensity increasing in a heavy ion synchrotron.** Nagaenko, M.G.; Reshetnikov, E.M.; Severgin, Yu.P.; Shukejlo, I.A. (Nauchno-Issledovatel'skij Inst. Ehlektrofizicheskoj Apparatury, Leningrad (USSR)). 1981. (In Russian). Joint Inst. for Nuclear Research, Dubna, USSR.

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

The process of heavy ion storage before injection into a synchrotron aimed at increasing its intensity, is described. The accumulation process in a simplified form is the following: a low-charged ion beam accelerated in an injector is injected into a vacuum chamber of a storage ring and it crosses a charge-exchange target installed inside the chamber. The target thickness is such that after a single crossing an equilibrium charge distribution is formed. The ions move along closed orbits which radial location corresponds to their charged states. Accumulation proceeds during hundreds of cycles. The magnetic ring scheme, which parameters correspond to conditions of uranium ion confinement at 10 MeV/nucleon energy, is described. The beam extraction scheme is shown.

21512 (CONF-8010206—Vol.1, pp 341-344) **Power supply of the B-430303;5 proton-ion synchrotron magnet.** Auslender, V.L.; Kuz'min, S.V.; Lapik, R.M.; Tomilov, V.P.; Tuvik, A.A. (AN SSSR, Novosibirsk. Inst. Yadernoj Fiziki). 1981. (In Russian). Joint Inst. for Nuclear Research, Dubna, USSR.

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

The power supply system of the B5 proton-ion synchrotron magnet where accelerator magnet magnetization is realized by permanent current, is described. Magnetization is realized by introducing a semiconductor rectifier into the magnet circuit. The direct component of the magnet current is closed through a separating reactor. There is a pause in the magnet current curve, which value is defined by the quality factor of the oscillatory circuit. The power suppy system of the magnet has the following parameters: the acceleration cycle frequency is 50 pulse/s, the magnet power capacity is 50 kJ, the maximum magnet current is 12 kA, the active losses in the circuit elements are 400 kW. The accuracy of keeping the magnetic field amplitude at the given level is +-0.1%. The flat top duration changes within the limits of zero to 600 μs.

21513 (CONF-8109205—2) **Sources of pulsed radiation.** Sauer, M.C. Jr. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 13p. NTIS, PC A02/MF A01. Order Number DE83007867.

From NATO Advanced Study Institute conference on fast processes and labile species in chemistry and molecular biology using ionizing radiation; Capri, Italy (7 Sep 1981).

Characteristics of various sources of pulsed radiation are examined from the viewpoint of their importance to the radiation chemist, and some examples of uses of such sources are mentioned. A summary is given of the application of methods of physical dosimetry to pulsed sources, and the calibration of convenient chemical dosimeters by physical dosimetry is outlined. 7 figures, 1 table.

21514 (CONF-8206118—8) **IPNS-I chopper spectrometers.** Price, D.L.; Carpenter, J.M.; Pelizzari, C.A.; Sinha, S.K.; Bresof, I.; Ostrowski, G.E. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 10p. NTIS, PC A02/MF A01. Order Number DE83007748.

From 6. annual international collaboration of advanced neutron sources meeting; Argonne, IL, USA (28 Jun 1982).

We briefly describe the layout and operation of the two chopper experiments at IPNS-I. The recent measurement on solid ^{4}He by Hilleke et al. provides examples of time-of-flight data from the Low Resolution Chopper Spectrometer.

21515 (CONF-8206118—9) **Electronically focused power diffractometers at IPNS-I.** Jorgensen, J.D.; Faber, J. (Argonne National Lab., IL (USA)). Nov 1982. Contract W-31-109-ENG-38. 15p. NTIS, PC A02/MF A01. Order Number DE83007610.

From 6. annual international collaboration of advanced neutron sources meeting; Argonne, IL, USA (28 Jun 1982).

Two powder diffractometers have been operated at IPNS-I since August 1981. The diffractometers achieve high resolution with large detector solid angles for scattering angles from +- 12 to 157° by electronically focussing the events from individual detectors in an on-line microprocessor.

21516 (CONF-8206163—1) **Accelerator mass spectrometry: from nuclear physics to dating.** Kutschera, W. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 27p. NTIS, PC A03/MF A01. Order Number DE83007863.

From 11. international radiocarbon conference; Seattle, WA, USA (20 Jun 1982).

The discussion reviews the use of accelerators originally intended for nuclear physics to do high resolution mass spectrometry for the purpose of isotope dating and age estimation of materials. (GHT)

21517 (DOE/ER/40010—965) **Calculated and measured emittance of sputter-type negative-ion source.** Billen, J.H. (Wisconsin Univ., Madison (USA)). 1981. Contract AC02-81ER40010. 4p. (CONF-821123—37). NTIS, PC A02/MF A01. Order Number DE83007298.

From 7. conference on the application of accelerators in research and industry; Denton, TX, USA (8 Nov 1982).

A method for calculating the beam current and emittance of a negative ion beam from a sputter-type source is described. Calculations are compared to measured emittance. The dependence of the emittance on ion source parameters such as cathode shape, exit aperture diameter, and cathode voltage is discussed.

21518 (GKSS—82/E/22) **Theoretical neutron spectrum of a 14 MeV neutron tube with cylindrical ion acceleration structure.** Bahal, B.M.; Fanger, H.U. (GKSS-Forschungszentrum Geesthacht G.m.b.H., Geesthacht-Tesperhude (Germany, F.R.). Inst. fuer Physik). 1982. 52p. NTIS (US Sales Only), PC A04/MF A01. Order Number DE83750188.

The energy distribution of '14 MeV neutrons' at the axial sample irradiation position of a sealed neutron tube with cylindrical acceleration structure used at the GKSS facility KORONA has been calculated. The underlying physical principles and the mathematical formulation are, to some detail, described in the paper. The most propable energy of the total neutron spectrum including elastic scattering is found to be 14.60 MeV with a FWHM of 0.60 MeV. The contribution of scattered neutrons is about 29%. The effects of scattering in the sample and the influence of the neutron spectrum on the average activation cross-section are discussed for some typical cases.

21519 (LA—9572-C-Vol.1) **Proceedings of the second LAMPF II workshop.** Thiessen, H.A.; Bhatia, T.S.; Carlini, R.D.; Hintz, N. (eds.). (Los Alamos National Lab., NM (USA)). Nov 1982. Contract W-7405-ENG-36. 410p. (CONF-820745—Vol.1). NTIS, PC A18/MF A01. Order Number DE83005000.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

The second LAMPF II Workshop was held at the Los Alamos Study Center from July 19 to 22, 1982. More than two hundred scientists from more than fifty institutions participated. A broad range of physics topics was covered from nuclear chemistry to testing grand unified theories. Numerous ideas for experiments were discussed, and several proposals for new beam line technology were developed. This workshop clearly demonstrated the enthusiasm which exists for a major extension of the field of medium energy physics which would be made possible by a machine of the class of the proposed LAMPF II 16-GeV 100-μA proton synchrotron.

21520 (LA—9572-C-Vol.1, pp 12-42) **Plans for LAMPF II.** Thiessen, H.A. (Los Alamos National Lab., NM). Nov 1982. NTIS, PC A18/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

A high-intensity 16- to 32-GeV proton accelerator is proposed. Several major areas of physics would benefit, including muons, neutrino physics, rare kaon decays, hypernuclei, and antiproton physics. The possibilities for constructing such a machine on the Los Alamos site and a preliminary cost estimate are discussed.

21521 (LA—9572-C-Vol.1, pp 43-57) **Kaon facility for TRIUMF.** Craddock, M.K. (TRIUMF, Vancouver, British Columbia). Nov 1982. NTIS, PC A18/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

A proposal is in preparation at TRIUMF for a 10 to 15 GeV, 100 μA proton accelerator as the basis of a kaon factory to yield beams of kaons, neutrinos and other secondary particles 100 to 1000 times more intense or with much better purity than those available at present. A whole range of new measurements would become possible in both particle and nuclear physics, e.g. symmetry violations in kaon decay, neutrino scattering, meson and baryon spectroscopy, hypernuclei, exotic atoms, K^+ studies of nuclear density, and resonance propagation in nuclei. A number of specimen experimental proposals is in preparation. Two options appear to be open for the 15 GeV accelerator. One would be a 30 Hz rapid-cycling proton synchrotron with separate accumulator and stretcher rings mounted in the same 80 m radius tunnel. The other would be a two-stage isochronous ring cyclotron using 5 T superconducting dc magnets. The first stage would be a 15 sector, 10 m radius machine going to 3.5 GeV, while the second stage of 42 sectors and 41 m radius would continue to full energy. The design of kaon beams of greater purity is also under way.

21522 (LA—9572-C-Vol.1, pp 391-395) **Antiproton-nucleus physics: LAMPF II nuclear physics working group report.** DiGiacomo, N.J. (Los Alamos National Lab., NM). Nov 1982. NTIS, PC A18/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

Intensive study of the interaction of low-energy (E/sub anti p/ ≦ 1 GeV) antinucleons with nuclei will commence with the inauguration of the LEAR Facility at CERN. Here we outline the physics accessible with high quality, reasonably intense (10^5 to 10^6/sec) beams of antiproton and then list the first generation of antiproton-nucleus anti pA experiments approved for LEAR.

21523 (LA—9572-C-Vol.1, pp 396-402) **Positrons and photons at LAMPF II.** Gram, P.A.M. (Los Alamos National Lab., NM). Nov 1982. NTIS, PC A18/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

There is an intriguing possibility that LAMPF II could become the source of a very useful beam of monochromatic photons in addition to the meson beams which have so far been discussed. This would create the opportunity to pursue an important class of electromagnetic experiments in an energy regime that is presently inaccessible. Stopping a 16 GeV proton beam in a properly chosen combustion of low Z and high Z target materials results in combined hadronic and electromagnetic cascade whose principal end products are positrons and electrons. These emerge into a surprisingly small spatial phase space with a wide and slowly varying spectrum of energies. A 0^0 beam line could readily be built to select positrons in a narrow momentum band and conduct them to a converter where monochromatic photons would be created by annihilation in flight. The positrons themselves might also be useful but the experiments to be done with them probably require higher beam intensity than is likely soon to become available.

21524 (LA—9572-C-Vol.2) **Proceedings of the second LAMPF II workshop.** Thiessen, H.A.; Bhatia, T.S.; Carlini, R.D.; Hintz, N. (Los Alamos National Lab., NM (USA)). Nov 1982. Contract W-7405-ENG-36. 382p. (CONF-820745—Vol.2). NTIS, PC A17/MF A01. Order Number DE83005001.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

Twenty individual papers from Volume II were prepared for the data base. The major topics include the CP violation working group, the muon working group, rare decays and hyperons, neutrino physics working group, nucleon/antinucleon working group, and exotic atoms working group. In addition to these papers, the volume contains concluding remarks, and talks from the February LAMPF II workshop. (GHT)

21525 (LA—9572-C-Vol.2, pp 542-551) **Possible neutrino beams, fluxes, and rates at LAMPF II.** Wang, K.C.; Allen, R.C.; Chen, H.H. (California Univ., Irvine). Nov 1982. NTIS, PC A17/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

Neutrino fluxes at LAMPF II with several different beam arrangements were calculated using numerical integration. Dependence of the flux on several parameters of the prospective neutrino facility was examined. Estimated event rates for nu/sub μ/e and nu/sub e/e elastic scattering are also given.

21526 (LA—9572-C-Vol.2, pp 609-618) **Collecting antiprotons at LAMPF II.** Mills, F.E. (Fermi National Accelerator Lab., Batavia, IL). Nov 1982. NTIS, PC A17/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

Existing and planned antiproton sources at CERN and Fermilab use production targets at the limit of temperature rise, debunching to reduce momentum spread (Fermilab), precooling (longitudinal at CERN, transverse at Fermilab) to help the stochastic accumulation system, and final stochastic cooling to achieve desired final beam properties. These systems are approaching limits in accumulation rate due to the high particle number density in frequency space (bad mixing), and limits in final beam properties for the same reason and due to high spatial density because of intrabeam scattering. It seems unlikely that higher frequency systems beyond 2 to 4 GHz will lead to much better performance because of weaker coupling to the beam and propagation of wave guide modes in the vacuum chamber. Thus it seems unlikely that rates much above ~ 2 x 10^7 anti p/s will be available from these systems. The development of fast transverse stochastic precooling systems in good mixing regimes, linear debunchers to accept higher momentum spreads of antiprotons, and megavolt electron beams (for free electron lasers) open possibilities for improved rates, perhaps by a factor of ten. It will develop that there are enough antiprotons produced at 16 GeV proton energy to accomplish this, but the task would be considerably simplified with 30 GeV proton where the production cross section is apparently six times higher. The outline of such a system is described.

21527 **(LA—9643-MS) Active tuning of rf cavities.** Rickey, M.E. (Los Alamos National Lab., NM (USA)). Dec 1982. Contract W-7405-ENG-36. 10p. NTIS, PC A02/MF A01. Order Number DE83007126.

An active tuning method for rf cavities for accelerators is investigated. First tests of the method at low power levels are reported.

21528 **(LBL—15238) Low-noise wide-band amplifiers for stochastic beam cooling experiments.** Leskovar, B.; Lo, C.C. (Lawrence Berkeley Lab., CA (USA)). 5 Sep 1982. Contract AC03-76SF00098. 18p. (CONF-820997—2). NTIS, PC A02/MF A01. Order Number DE83007043.

From Workshop on beam cooling; Stoughton, WI, USA (9 Sep 1982).

Noise characteristics of the continuous-wave wide-band amplifier systems for stochastic beam cooling experiments are presented. Also, the noise performance, bandwidth capability and gain stability of components used in these amplifiers are summarized and compared in the 100 MHz to 40 GHz frequency range. This includes bipolar and field-effect transistors, parametric amplifier, Schottky diode mixer and maser. Measurements of the noise characteristics and scattering parameters of variety GaAs FETs as a function of ambient temperature are also given. Performance data and design information are presented on a broadband 150-500 MHz preamplifier having noise temperature of approximately 35°K at ambient temperature of 20°K. An analysis of preamplifier stability based on scattering parameters concept is included.

21529 **(PB—82-226895) Terminal pumping using a turbomolecular pump as a recirculating gas compressor.** McK.Hyder, H.R. (Oxford Univ. (UK). Nuclear Physics Lab.). 1982. 16p. NTIS, PC A02/MF A01.

Tests were carried out to confirm the suitability of the Turbovac 150 as a terminal pump in tandem accelerators and to find out if it can be powered directly from a 400 Hz power supply.

21530 **Determination of transverse shielding for proton accelerators using the Moyer Model.** Stevenson, G.R. (European Organization for Nuclear Research, Geneva (Switzerland)); Kuei-Lin, L. (Academia Sinica, Beijing (China). Inst. of High Energy Physics); Thomas, R.H. (California Univ., Berkeley (USA). Lawrence Berkeley Lab.; California Univ., Berkeley (USA). School of Public Health). *Health Physics;* 43: No. 1, 13-29(Jul 1982).

The historical development of the Moyer Model-an empirical method used in the design of high energy proton accelerator shielding-is described. With the improvements in the understanding of high-energy radiation phenomena which have occurred during the past 20yr it is now possible to lay a more satisfactory theoretical basis for this model. Several measurements at various high energy proton accelerators now make it possible to improve the parameters used in the model and consequently to increase its accuracy. An example of the use of the model to calculate transverse shielding for an extended uniform line source is given and comparison made with calculations by O'Brien.

21531 **(CAPE—2788) SLAC positron-source station Mark II (Engineering Materials).** (Stanford Linear Accelerator Center, CA (USA)). 1982. Contract AC03-76SF00515. K. Order Number DE83005719.

The drawing list DL 900-838-00-R1 and the listed drawings therefrom provide partial information for construction and installation of the SLCA positron Source Assembly. The drawings listed are primarily concerned with the magnets and their supports. Other details and drawings on the drawing list, not supplied here, do provide the remaining details for construction of the complete assembly as used at SLAC. The complete positron source provides positrons and electrons when the target is bombarded by energetic electrons. Positrons are separated from the electrons by means of an rf separator and a magnet system and further accelerated to the desired energy along the remaining two-thirds of the accelerator. The drawing list and the listed drawings on Drawing List DL 900-840-00-R0 provide patial construction information for the Tapered Field Solenoid (TFS) which is part of the longer Positron Source System at SLAC. Complete details are contained in the remaining drawings, not supplied for the TFS.

21532 **(CAPE—2790) RF particle separator for the SLAC linear accelerator's positron source (Engineering Materials).** (Stanford Linear Accelerator Center, CA (USA)). 1982. Contract AC03-76SF00515. K. Order Number DE83005721.

The drawing list and listed drawings comprise the necessary drawings and specifications to construct the 24-inch-long rf particle separator used to help separate electrons from positrons emanating from the SLAC positron source target/radiator. Input power used at SLAC is typically 1.5 MW peak and at a frequency of 2856 MHz. Operating mode is HEM_{11}. At 1.5 MW peak input power the deflection on either electrons or positrons is approximately 0.5 MeV/c.

21533 **(CAPE—2801) Profile monitor (at Accelerator Sections 28-9 and 29-9) (Engineering Materials).** (Stanford Linear Accelerator Center, CA (USA)). 1982. Contract AC03-76SF00515. K. Order Number DE83005685.

The Drawings listed on drawing list DL 900-411-42 provide the construction and installation data for the profile monitors used at the drift sections 28-9 and 29-9 on the SLAC Two-Mile Linear Accelerator. These devices when properly activated insert a fluorescent screen into the beam line which glows in the area of electron or positron bombardment. Use of remote television cameras or other viewing devices allows the operator to position and/or shape the beam by adjusting the appropriate linac controls.

21534 **(CAPE—2873) PEP beam-position monitor system (Engineering Materials).** (Stanford Linear Accelerator Center, CA (USA)). 1981. Contract AC03-76SF00515. K. Order Number DE83005679.

The drawings under this series provide construction and installation information about the various components of the PEP Storage Ring's Beam Position Monitoring System. The complete system provides electronic signals for data taking, visual presentation, computer control and other general operational functions. The devices range from beam-line cavity or pickup devices thru the cabling and display devices.

21535 **Hollow cathode and ion accelerator system for current ion sources.** Aston, G. (JPL, Pasadena, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1498-1501(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A small self-heating hollow cathode has been designed and tested which uses a novel flowing plasma starting concept to eliminate the need for cathode heating elements and low work function insert materials. In a magnetic field free ion source, this cathode has reliably and repeatedly produced arc currents, using argon, of 100 ampere (the power supply limit) at arc voltages of 22 volts. The cathode operates with a high gas stagnation pressure and plasma density to produce field enhanced thermionic emission from the electron emitting surface, a 0.02mm thick rolled tungsten foil cylinder, without appreciable erosion of this surface. Possible applications of larger versions of this hollow cathode for use in neutral beam injector ion sources are discussed. An ion accelerator system has also been designed and tested which combines a unique arrangement of multiple hole and slit apertures to amplify the extracted ion current density by a factor of four during the ion acceleration process.

21536 Radiation lifetimes and failure mechanisms of carbon stripper foils. Auble, R.L. pp 158-162 of Proceedings of the third international conference on electrostatic accelerator technology. Oak Ridge, TN; Oak Ridge National Laboratory (1981). Contract W-7405-ENG-26.

Measurements of lifetimes of thin carbon foils under heavy-ion irradiation are compiled and recent advances in stripper foil technology are reviewed. The impact of recent foil lifetime improvements, many by more than an order of magnitude, on heavy-ion electrostatic accelerators is discussed. Foil inhomogeneities, particularly those caused by sputtering are suggested to be a prime factor in usable foil lifetimes.

21537 (CAPE—2768) SLAC 38 MW pulsed Klystron, Model XK-5 (Engineering Materials). (Stanford Linear Accelerator Center, CA (USA)). [nd]. Contract AC03-76SF00515. TIC. Order Number DE83005732.

Assembly drawing AD-704-011-00 provides the overall assembly drawing with references to subsequent subassembly and fabrication drawings and defines and provides the information for constructing a SLAC 40MW pulsed Klystron model XK-5. Nominal specifications are: power out-38 MW; pulse width-2.5 μs; and beam voltage-270 kV.

21538 (CAPE—2759) Electron gun SLAC Model 5-3 (Engineering Materials). (Stanford Linear Accelerator Center, CA (USA)). [nd]. Contract AC03-76SF00515. TIC. Order Number DE83005767.

The drawings on DL 790-150-00 provide the data and specifications for constructing the model 5-3 electron gun as used on the Stanford Linear Accelerator Center's two-mile linear accelerator. This gun was developed to give short pulse lengths of electrons for use with the SPEAR and PEP storage rings. It is also suitable for regular beams that use currents of 2 μs lengths. The gun is a triode which allows pulse lengths to be varied as a function of grid voltage. The basic specifications of the gun are: 2A max at 80 kV; 360 pps max (design); pulse lengths from 1 ns to 2 μs; grid cutoff voltage -40 vdc; and max current grid voltage +150 vdc.

21539 (CAPE—2758) Subharmonic buncher section (SLC) (Engineering Materials). (Stanford Linear Accelerator Center, CA (USA)). [nd]. Contract AC03-76SF00515. TIC. Order Number DE83005766.

Drawing list DL 795-645-00 and the drawings thereon provide the data and specification for construction of a special subharmonic buncher section to provide pre-bunching for the Stanford Linear Accelerator Center's linear collider project's injector system. The buncher (2 in tandem) takes 3 ns bunches and reduces the bunch length to that of 1 cycle at 2856 MHz, the accelerator's accelerating rf frequency. The buncher frequency is 178.5 MHz at approximately 10 kW in each section for acceptable bunching.

21540 (CAPE—2756) 7-foot accelerator section (Engineering Materials). (Stanford Linear Accelerator Center, CA (USA)). [nd]. Contract AC03-76SF00515. TIC. Order Number DE83005768.

9 35 MM aperture cards.

The included drawings plus the drawings on DL 750-207-00-RO (3 pages) 10 Foot Accelerator, final Body Braze, Sectors 2-30 provide the data and specifications for constructing a 7 foot long Stanford Linear Accelerator Center type of accelerator section. The units were used on the SLAC Two Mile Accelerator where a 10 foot section would not fit because other beam line devices needed the space.

21541 (CAPE—2754) Bunch monitor-standard drift section (Engineering Materials). (Stanford Linear Accelerator Center, CA (USA)). [nd]. Contract AC03-76SF00515. TIC. Order Number DE83005777.

Drawing list DL-795-615-00 provides the drawings, data and specifications for constructing a bunch monitor used on the Stanford Linear Accelerator Center Two-Mile linear accelerator. The device is used to monitor the amplitude of the bunches as they traverse the monitor cavity. The assembly contains a 2856 MHz cavity, a 24280 MHz cavity, and a current toroid. The current toroid was included because of space considerations. The 2856 and the fifth harmonic cavities were originally designed to provide bunch length, however, maximizing the fifth harmonic on an oscilloscope with maximum gain and the zero depressed gives adequate sensitivity for detecting best bunching of the electrons.

21542 (CAPE—2753) Lens: two-gun injector (Engineering Materials). (Stanford Linear Accelerator Center, CA (USA)). [nd]. Contract AC03-76SF00515. TIC. Order Number DE83005772.

The assembly drawing and the drawings called out on it and subsequent drawings provide the data and specifications for constructing the magnetic thin lens used on the SLAC two-mile linear accelerator's injector system which has two electron guns installed. The lens allows the focusing of the electron beam as it is emitted from its related gun. There are six of these lenses spaced to allow appropriate focusing of the electron bunches/beam after it leaves its gun and proceeds down the beam pipe and subsequently enters the injector accelerator section.

21543 (CAPE—2750) Layout, SLAC accelerator injector system (Engineering Materials). (Stanford Linear Accelerator Center, CA (USA)). [nd]. Contract AC03-76SF00515. TIC. Order Number DE83005771.

8 35 MM aperture cards.

The listed drawings provide a combination layout, schematic and some detail of the Stanford Linear Accelerator Center's Injector for the two-mile linear accelerator. These drawings as a group do not supply all the details but are intended to provide insight for discussion and possibly for some engineering design.

21544 (CAPE—2748) SLAC high-current electron gun (Engineering Materials). (Stanford Linear Accelerator Center, CA (USA)). [nd]. Contract AC03-76SF00515. TIC. Order Number DE83005769.

8 35 MM aperture cards.

The high current electron gun described by drawing AD-795-648-00 R1E gives up to 12 amperes of pulsed current when the proper voltages are applied. The following are the maximum design specifications: 12 A pk, 200 kV, 2 μs pulse width, and 180 pps. Tests have only verified operation at 160 kV, 60 pps, 5 ns pulse width, and 6A pk.

21545 (CAPE—2749) SLAC Accelerator Section-Injector (Engineering Materials). (Stanford Linear Accelerator Center, CA (USA)). [nd]. Contract AC03-76SF00515. TIC. Order Number DE83005770.

The main drawing lists the drawings needed for constructing the Stanford Two Mile Linear Accelerator's Injector section assembly. The system consists of a standard 3 metre accelerator section plus a nu/sub p/ = 0.75 c buncher section. It is mounted in a stainless steel tube which supports the solenoid focusing coils. The system is designed to accept 0.5 c prebunched electrons and accelerate them to very nearly the velocity of light (≈ 0.999 c). The electrons are bunched into ~ 5^0 at 2856 MJHz.

21546 (CAPE—2808) Selected PEP vacuum components (Engineering Materials). (Stanford Linear Accelerator Center, CA (USA)). [nd]. Contract AC03-76SF00515. TIC. Order Number DE83008121.

The drawings listed provide the information for construction of the listed titles of the SLAC PEP vacuum systems (window assembly-vacuum chamber septum, vacuum chamber septum, and vacuum fault module). The septum vacuum chamber is used in the electron and positron ring injection magnets. The vacuum fault modules are part of the overall electronic-vacuum system.

21547 **(CAPE—2809) Vacuum system electronics for main injector fast valve control and beam shut off: system schematic SS 101-010-00 (2 shts) (Engineering Materials).** (Stanford Linear Accelerator Center, CA (USA)). [nd]. Contract AC03-76SF00515. TIC. Order Number DE83007292.

The drawings listed provide the electronic schematic of the electronic system used to control the Fast Valve Controller and beam shut off system for the injector area of the SLAC Two-Mile Linear Accelerator. Vacuum sensors detect a rising pressure and the Fast Valve Controller reacts by closing the appropriate beam line fast valves to isolate the high vacuum of the rest of the Accelerator from the area of higher pressure. Concurrently the Tone Control Loop activates the devices that deactive the electron gun and thereby shuts the beam off so that the valves are not damaged.

21548 **(CAPE—2807) Selected SLAC vacuum control units (Engineering Materials).** (Stanford Linear Accelerator Center, CA (USA)). [nd]. Contract AC03-76SF00515. TIC. Order Number DE83008122.

The listed drawings provide the construction information for the SLAC devices listed (PLS mag vacuum intlk, VGC discriminator and drivers, API meter vac gauge controller, and vacuum gauge control pnl). These are parts of the overall Linear Accelerator's vacuum electronic control system. The main item described is the Vacuum Gauge Controller.

21549 **(CAPE—2715) Electron gun SLAC model 5-3 (Engineering Materials).** (Stanford Linear Accelerator Center, CA (USA)). [nd]. Contract AC03-76SF00515. TIC. Order Number DE83008118.

The drawings on DL 790-150-00 provide the data and specifications for constructing the model 5-3 electron gun as used on the Stanford Linear Accelerator Center's two-mile linear accelerator. This gun was developed to give short pulse lengths of electrons for use with the SPEAR and PEP storage rings. It is also suitable for regular beams that use currents of 2 μs lengths. The gun is a triode which allows pulse lengths to be varied as a function of grid voltage. The basic specifications of the gun are: 2A max at 80 kV, 360 pps max (design), pulse lengths from 1 ns to 2 μs, grid cutoff voltage -40 vdc, and max current grid voltage +150 vdc.

21550 **(CAPE—2691) Alpha magnet assembly (Engineering Materials).** (Stanford Linear Accelerator Center, CA (USA)). [nd]. Contract AC03-76SF00515. TIC. Order Number DE83008117.

The listed drawings provide manufacturing information necessary to construct a magnet used to inject electrons or other charged particles into a linear-type accelerator from a non-inline source. A moderate amount of focusing is provided by the fringe fields of the magnet. The magnet can be pulsed at frequencies up to 360 pps. With proper beam line magnetic compensation several injector Alpha magnets can be used in series in the main beam line.

21551 **(CAPE—2806) SLAC hybrid power divider (Engineering Materials).** (Stanford Linear Accelerator Center, CA (USA)). [nd]. Contract AC03-76SF00515. TIC. Order Number DE83006823.

The listed drawings provide the construction information for one of the waveguide power dividers used on the SLAC linear accelerator. These drawings define the power divider used in the accelerator housing to divide the power from the Klystron and direct it to the inputs of 2 of the 4 accelerator sections on a 40 foot girder assembly. The central divider portion is used in a similar power divider used in the Klystron Gallery to divide the Klystron power by 2. Drawing SA767-306-03-R5 is a representative sub-assembly that defines one specific use at SLAC of the Hybrid power splitter.

4304 Storage Rings

REFER ALSO TO CITATION(S) 21507, 21614, 22273, 22301

21552 (CONF-8010206—Vol.1, pp 32-56) **Fermilab antiproton-proton collider and source.** Cline, D.B. (Wisconsin Univ., Madison (USA)). 1981. Joint Inst. for Nuclear Research, Dubna, USSR.

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

Present status of the development of the Fermilab antiproton-proton collider and source intended for searching the intermediate vector bosons is described. The expected luminosity to be reached is 10^{30} cm^{-2} s^{-1}. The Fermilab scheme uses two storage rings and a cycle of beam deceleration and both stochastic cooling (precooling) and electron cooling at the lower energy. Layout of precooling system is shown. The number of rf accelerating cavities of the tevatron storage ring will be increased from three to six. Four of the cavities will be dedicated to protons and two to antiprotons. The forward spectrometer consisting of a dipole spectrometer, a Cherenkov ring imaging system, a transition radiation detectors, an electromagnetic shower calorimeter, and a hadron calorimeter is presented.

21553 (CONF-8010206—Vol.1, pp 259-265) **Proton-antiproton colliding beam electron cooling.** Derbenev, Ya.S.; Skrinskij, A.N. (AN SSSR, Novosibirsk. Inst. Yadernoj Fiziki)). 1981. (In Russian). Joint Inst. for Nuclear Research, Dubna, USSR.

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

A possibility of effective cooling of high-energy p anti p beams ($E=10^2$-10^3 GeV) in the colliding mode by accompanying radiationally cooled electron beam circulating in an adjacent storage ring is studied. The cooling rate restrictions by the p anti p beam interaction effects while colliding and the beam self-heating effect due to multiple internal scattering are considered. Some techniques permitting to avoid self-heating of a cooling electron beam or suppress its harmful effect on a heavy particle beam cooling are proposed. According to the estimations the cooling time of 10^2-10^3 s order can be attained.

21554 (CONF-8010206—Vol.1, pp 266-268) **Study on the compensation of electron beam space charge in facilittes with electron cooling.** Dikanskij, N.S.; Kudelajnen, V.I.; Parkhomchuk, V.V.; Pestrikov, D.V. (AN SSSR, Novosibirsk. Inst. Yadernoj Fiziki)). 1981. (In Russian). Joint Inst. for Nuclear Research, Dubna, USSR.

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

The results of experimental investigations of a compensated electron beam on the NAP-M facility are presented. The electron beam is compensated by electrostatic plugs preventing ion leakage along the beam. Cut-off electrodes have the shape of cutted cylinders encircling the electron beam. To eliminate electron accumulation around the plugs one of the electrodes has a zero potential, which results in formation of an transverse electric field causing ionization electron drift in the transverse direction to the electric and magnetic fields. The effect of wave damping, in the compensated beam is observed, that demonstrates the possibility of gaining great current densities in long compensated beams necessary for antiproton storage. For the NAP-M at the 10^{10} cm/s electron velocity, 300 cm length of ion column, and 1 kOe field intensity the threshold beam current density is 0.96 A/cm^2.

21555 (CONF-8010206—Vol.1, pp 288-292) **Different type modulation effect on decreasing the stochasticity threshould in beam-beam interaction.** Vasserman, I.B.; Izrajlev, F.M. (AN SSSR, Novosibirsk. Inst. Yadernoj Fiziki)). 1981. (In Russian). Joint Inst. for Nuclear Research, Dubna, USSR.

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

Comparative investigations of different types of modulation and their combined effect on decreasing the stochasticity threshold in colliding beam installations are considered. The interaction of a single particle with a field of an infinitely short colliding beam is studied in the one-dimensional approximation. The betatron phase modulation and external perturbation amplitude modulation are considered. It is shown that overlapping of nonlinear resonances for the lack of modulation is a cause of stochastic instability. The dependence of the threshold value of the critical current density on the modulation amplitude is given. It is also shown that the phase modulation leads to formation of side resonances near every main resonance, where each of the side resonances is splitting that facilitates overlapping of all the subsidiary resonances.

21556 (CONF-8010206—Vol.1, pp 302-305) **VLEPP conversion system for polarized beam production.** Balakin, V.E.; Mikhajlichenko, A.A. (AN SSSR, Novosibirsk. Inst. Yadernoj Fiziki)). 1981. (In Russian). Joint Inst. for Nuclear Research, Dubna, USSR.

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

The solution of the beam conversion problem for energies of several hundred GeV with production of polarized positrons and electrons is proposed for the first time. The essence of the method consists in irradiating a thin target by a beam of circularly polarized high-energy photons, which, in turn, are produced when the beam passes through initial particles through a helical ondulator. Interaction of photons with the target results in production of electron-positron pair and the Compton electrons, which appear to be polarized in the direction of photon polarization at the upper boundary of energy spectrum. Then the produced positrons and electrons are reaccelerated and injected into the storate ring, where the beam is cooled due to synchrotron radiation. Some conversion circuit is considered and approximate characteristics of the system for the electron-positron beam collider are presented.

21557 (CONF-8010206—Vol.1, pp 13-22) **IHEP accelerating-storage facility (present status).** Ageev, A.I.; Balbekov, V.I.; Gridasov, V.I. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1981. (In Russian). Joint Inst. for Nuclear Research, Dubna, USSR.

From 7. all-union national conference on particle accelerators; Dubna, USSR (14 Oct 1980).

The status of development of separate systems of the IHEP accelerating-storage facility (ASF) is described. Several superconducting dipole models of 1 m length are constructed and studied. A trapezoidal transposed cable of 23 wires, each 0.85 mm in diameter, containing 1045 NbTi filaments of 17 μm thickness, is used as a current-carrying element of the model windings. During immerison tests a>5 T field is attained. To find out the possibility of creating 10^{-9} Torr vacuum in the chamber of the ASF first stage the dependence of the gassing rate and composition of residual gas on the chamber surface treatment technology is studied. The conceptual design of the cryogenic supply system consisting of six helium liquefiers, each of 1000 l/h capacity, 24 satellite refrigerators of 2100 W power at 4K and 4600 W power at 80 K, is completed. For helium compression 40 helical compressors at 500 kg/h capacity will be used. The ASF accelerating resonators are studied on rigs. Investigations on optimization of the beam injection and extraction systems are being conducted at present. To reduce irradiation provision is made for placing steel collimators of the 6 m length in front of the superconducting magnetic system. It is expected to ensure slow beam extraction at the 3 TeV energy with the 10^{14} proton/cycle and fast beam extraction with the 10^{13} proton/pulse.

21558 (DOE/SF/00515—T4) **PEP storage ring magnets and power supply system.** (Stanford Linear Accelerator Center, CA (USA)). 1982. Contract AC03-76SF00515. 97p. NTIS, PC A05/MF A01. Order Number DE82014964.

Operating and service instructions are given for the PEP storage ring magnet power supplies. Reference CAPE-2747. (GHT)

21559 (LA-UR—83-299) **New method for inverting the closed-orbit distortion problem.** Warren, J.L.; Channell, P.J. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 4p. (CONF-830311—3). NTIS, PC A02/MF A01. Order Number DE83007540.

From Particle accelerator conference; Santa Fe, NM, USA (21 Mar 1983).

A certain class of magnet misalignments in storage rings and other accelerators produces closed-orbit distortions (CODs). Quite often the CODs are measured at a fewer number of locations (N) than the number of misalignment parameters (M). There is a linear relation between COD measurements, u(j), j=1, ..., N and the misalignment parameters e(k), k=1, ..., M. Hence the e(k)'s are underdetermined. If M < 2N, one can obtain an overdetermined set of equations by measuring the COD at two quadrupole settings. There are several ways of inverting the COD measurements to get the misalignment parameters that are fairly insensitive to errors in the measured CODs. A comptuer program called CODINV has been written to test some of these schemes. Two schemes give fairly good results when applied to the lattice of the Los Alamos Proton Storage Ring (PSR). The first scheme requires measurements at two nearby tunes and the use of singular-value decomposition methods. The second scheme requires measurements of the CODs in the FODO and DOFO cell arrangements but is easier mathematically.

21560 (SLAC-PUB—3022) **Storage ring design optimization for FEL operation.** Wiedemann, H. (Stanford Linear Accelerator Center, CA (USA)). Nov 1982. Contract AC03-76SF00515. 9p. (CONF-820988—6). NTIS, PC A02/MF A01. Order Number DE83007060.

From Free electron laser conference; Bendor, France (26 Sep 1982).

An electron beam in a storage ring seems to be a perfect driver for a free electron laser. The understanding of storage rings is very well advanced to project designs with high peak current, small beam sizes and short damping times. Since the beam is recycled after passage through the optical cavity we can expect a relatively high overall efficiency. On the other hand, however the fact that we do want the beam to circulate and interact with the laser field every turn puts a limit on the allowable perturbation of the beam due to the laser field. This limits the peak laser power we can get from a storage ring beam. The main advantage of a storage ring for FEL operation therefore is realized for continuous high power laser generation. In this paper we discuss some of the limitations in storage ring beam parameter as they pertain to FEL operation. The interaction of a FEL field with the beam, however, is not discussed here.

21561 (CAPE—2791) **SHAM: Liquid Argon Sample and Hold Module (Engineering Materials).** (Stanford Linear Accelerator Center, CA (USA)). 1981. Contract AC03-76SF00515. K. Order Number DE83005722.

9 35 MM aperture cards.

The drawings listed on Drawing List DL-135-347-00 provide the data and specifications to construct the SHAM Liquid Argon Sample and Hold Module used on the Liquid Argon Shower Counters of the Mark II Detector at SPEAR. The module accepts shaped bipolar pulses of 600 ns rise time (0 to 100%). It contains 32 channels with 0 to +5 volts, transformer coupled input and 0 to +5 volts from 120 ohms. Physical size is a single width CAMAC module.

21562 (CAPE—2762) **PEP r-f accelerating cavities (Engineering Materials).** (Stanford Linear Accelerator Center, CA (USA)). [nd]. Contract AC03-76SF00515. TIC. Order Number DE83005775.

The listed drawings and those listed on the drawings provide the data for construction of the r-f acceleration cavity sections used on the Stanford Linear Accelerator Center (SLAC) PEP storage ring. These cavities provide the make-up energy lost through synchrotron radiation for the circulating positron and electron beams. These cavities at PEP are driven by CW Klystrons.

21563 (CAPE—2752) **PEP r-f low-level system (phase lock, gap voltage, and frequency control) (Engineering Materials).** (Stanford Linear Accelerator Center, CA (USA)). [nd]. Contract AC03-76SF00515. TIC. Order Number DE83005776.

8 35 MM aperture cards.

The listed drawings and subsequent referenced drawings therein provide the data and specifications for construction of the phase lock, gap voltage, and frequency control systems used to control the rf accelerating cavity parameters of the Stanford Linear Accelerator Center's PEP storage ring. The phase lock portion is a phase locking system which maintains a constant phase relationship of the cavity phase to the drive (reference) phase by controlling an rf phase shifter. The gap voltage loop maintains a constant accelerating field at the gap in the cavity. The frequency control-tuning loop provides the means for keeping the cavity tuned to the ring's rf frequency by adjusting the cavity's mechanical tuner.

21564 **(CAPE—2751) 50-MHz SPEAR r-f cavities (out of use since 1976) (Engineering Materials).** (Stanford Linear Accelerator Center, CA (USA)). [nd]. Contract AC03-76SF00515. TIC. Order Number DE83005773.

6 35 MM aperture cards.

Drawing SA-443-001-05 and subsequently referenced drawings therein provide the data and specifications for constructing a 50 MHz rf accelerating cavity used on the Stanford Linear Accelerator Center's SPEAR storage ring up to 1976. These cavities provided the make-up energy lost through synchrotron radiation of the circulating positron and electron beams: until they were replaced with more efficient cavities designed for 356 MHz rf.

44 INSTRUMENTATION

21565 **(ORNL—5931-Vol.1) Instrumentation and Controls Division progress report, September 1, 1980-July 1, 1982.** Klobe, L.E.E. (ed.). (Oak Ridge National Lab., TN (USA)). Dec 1982. Contract W-7405-ENG-26. 207p. NTIS, PC A10/MF A01. Order Number DE83007174.

Activities are reported by the Reactor Systems Section, Research Instrument Section, and the Measurement and Controls Engineering Section. Reactor system activities include dynamic analysis, survillanc and diagnostic methods, design and evaluation, detectors, facilities support, process instrumentation development, and special assignments. Activities in the Research Instrument Section include the Navy-ORNL RADIAC development program, advanced γ and x ray detector systems, neutron detection and subcriticality measurements, circuit development, position-sensitive detectors, stand-alone computers, environmental monitoring-detectors and systems, plant security, engineering support for fusion energy division, engineering support for accelerator physics, and communications: radio, closed-circuit tv, and computer. Activities in the Measurement and Controls Engineering Section include the AVLIS program; gas centrifuge enrichment technology support; Advanced Instrumentation for Reflood Studies (AIDRS) program; instrumentation development support for fuel reprocessing; in-core experiments and reactor systems; energy, conservation, and electric power systems; computer systems; measurements research; and fossil energy studies Publications are listed. (WHK)

4401 Radiation Instrumentation

REFER ALSO TO CITATION(S) 19428, 19892, 20328, 20710, 21513, 21971, 22092, 22093, 22115, 22116, 22117, 22118, 22119, 22122, 22273, 22543

21566 **(ANL/NESC—485R) GASPAN; complex gamma-ray spectra analysis.** Michne, J.D. (Knolls Atomic Power Lab., Schenectady, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048485.

GASPAN must be aligned with the particular detector system it uses. It will accept data for up to 1024 channels.

GASPAN analyzes output pulses from a lithium-drifted germanium semiconductor detector to define complex gamma-ray spectra of routine crud and filtrate samples.CDC6600; FORTRAN IV; SCOPE; CDC6600 and CalComp plotter.

21567 **(ANL/NESC—902) QLN1; quantitative gamma-ray spectra analysis.** Yule, H.P. (NUS Corp., Gaithersburg, MD (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048902.

Maximum of - 100 peaks per spectrum.

QLN1 identifies gamma-ray emitters contributing to Ge(Li) detector spectra, and computes quantitative amounts of isotopes contributing to the data.UNIVAC1108,1100; FORTRAN V; EXEC8; The LISTER program requires 35,000 words of memory and 5 direct-access devices (logical units 10, 14, 28, 29, and 31) for execution. QLN1 requires 47,000 words of memory and 5 direct-access devices (logical units 14, 20, 21, 22, and 23) for execution.

21568 **(CONF-811012—65) Optimization of a Hornyak-button detector for fast-neutron detection.** Fink, C.L. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 5p. NTIS, PC A02/MF A01. Order Number DE83007653.

From IEEE symposium on nuclear science; San Francisco, CA, USA (21 Oct 1981).

As part of an ongoing program to improve the fuel-motion capability of the fast-neutron hodoscope, a response model has been developed for the Hornyak-button detector. The model provides a description of the efficiency and gamma sensitivity of a Hornyak button in terms of detector parameters such as scintillator concentration, grain size, length, and transparency. It is possible using this model to quantitatively choose detector parameters for the Hornyak button.

21569 **(CONF-811012—66) Cathode uniformity of new square photomultiplier tubes.** Brenner, R.; Chou, H.P.; Strauss, M.G.; Winiecki, A.L. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 6p. NTIS, PC A02/MF A01. Order Number DE83007686.

From IEEE symposium on nuclear science; San Francisco, CA, USA (21 Oct 1981).

Square photomultiplier tubes (PMTs) should have better light collection than round PMTs when used in square or rectangular Anger-type γ-ray or neutron position detectors. Photocathode response uniformity of new RCA square PMTs type S83003E (51.5 x 51.5 mm^2) was measured and compared with conventional round PMTs. The PMTs were scanned with a small scintillation source while the anode signal amplitudes were processed in a computer-based multichannel analyzer. The analyzer was programmed in a mode which virtually eliminates effects due to statistical fluctuations in source rate and output amplitude. Pulse heights as a function of source position on the PMT face are shown for typical tubes. The response uniformity of 64 square PMTs and 21 round ones was evaluated. It is shown that the center region of the square PMTs is as uniform as that of the round ones and that the response in the corners is comparable to that in the center. Thus square PMTs appear to have an advantage for use in square or rectangular position detectors.

21570 **(CONF-820667—8) Introduction to fifth international workshop on mercuric iodide nuclear radiation detectors.** Schieber, M. (Hebrew Univ., Jerusalem (Israel); EG and G, Inc., Goleta, CA (USA)). 1982. Contract AC08-83NV10282. 6p. NTIS, PC A02/MF A01. Order Number DE83006571.

From 5. international workshop on HgI/sub 2/ nuclear radiation detectors; Jerusalem, Israel (6 Jun 1982).

Mercuric iodide is a wide bandgap semiconductor, with Eg ≈ 2.14 eV at room temperature. Therefore, HgI_2 is totally different from the well-studied, narrower gap, elemental semiconductors such as Si and Ge, and also different in its physical and chemical properties from the known semiconductor binary zinc-blend compounds such as GaAs or InP. The purpose of studies in the last decade was to further our understanding of HgI_2; recent progress is reported. (WHK)

21571 **(CONF-8206118—10) Tests of a resonance detector spectrometer for electron-volt spectroscopy.** Carpenter, J.M.; Watanabe, N.; Ikeda, S.; Masuda, Y.; Sato, S. (National Lab. for High Energy Physics, Oho, Ibaraki (Japan)). 1982. Contract W-31-109-ENG-38. 13p. NTIS, PC A02/MF A01. Order Number DE83007611.

From 6. annual international collaboration of advanced neutron sources meeting; Argonne, IL, USA (28 Jun 1982).

We have tested a resonance detector spectrometer at the KENS neutron source, using ^{181}Ta, ^{121}Sb and ^{149}Sm absorbers and bismuth germanate (BGO), NaI and plastic scintillators. In the process we uncovered and solved numerous background problems, and discovered a time-focussing principle. We measured the scattering from a number of materials and so far have analyzed and present results for bismuth and graphite. Tests of cooled absorbers have indicated that resolution of 70 MeV is possible with ^{181}Ta.

21572 (DOE/NV/10282—T1) **Review of mercuric iodide development program in Santa Barbara.** Lamonds, H.A. (EG and G, Inc., Goleta, CA (USA)). 1982. Contract AC08-83NV10282. 16p. NTIS, PC A02/MF A01. Order Number DE83007412.

Crystal growth and device fabrication methods used at EG and G Santa Barbara are reviewed. The chemical and structural characterization of the grown crystals and the different types of detectors and their areas of application are also briefly described. The experimental results presented, especially with respect to the spectral response of detectors with thicknesses of 1 cm or more, indicate the large potential of mercuric iodide as a material for future detector applications.

21573 (FERMILAB/TM—1155) **Design of the magnetized muon shield for the prompt-neutrino facility.** Baltay, C.; Bosek, N.; Couch, J. (Fermi National Accelerator Lab., Batavia, IL (USA)). 12 Oct 1982. Contract AC02-76CH03000. 135p. NTIS, PC A07/MF A01. Order Number DE83007872.

The main technical challenge in the design of the prompt neutrino beam is the magnetized muon shield. Two satisfactory alternate designs have been developed for such a shield during this past year and the background muon fluxes have been calculated by three independent programs at Columbia, Fermilab, and MIT. The background muon fluxes have been calculated to be satisfactory in all of the detectors that might use the beam. In Section III of this report we describe in detail the three Monte Carlo programs used in these calculations. In Section IV we give the details of the flux calculations for the E-613 shield and the comparisons with the observed fluxes with various configurations of that shield. In Section V we describe the designs that have been developed for the neutrino area shield. In Section VI we discuss the problem of proton beam transport losses and the associated muon fluxes. Finally, in Section VII a comparison of the two solutions is made which covers cost, effectiveness, schedule and responsiveness to future unknowns. We conclude that there are not overwhelming reasons for the choice of one design over the other. However, for a variety of secondary reasons the superconducting design offers advantages. We therefore propose the construction of the prompt neutrino facility with the superconducting magnet design.

21574 (FOA-C—40138-A3) **Control of the intensimeter RA 73 used in Switzerland.** Ulvs, T.; Hulten, G. (Research Inst. of National Defence, Umea (Sweden)). Aug 1981. 14p. (In Swedish). NTIS, PC A02/MF A01.

The intensimeter used by the Swiss and French military, the 'Control and Alarm Radiation Meter, model RA 73' was tested for accuracy under various conditions. The intensimeter has a very low energy and exposure rate dependency. The effect of humidity and temperature variation is low (less than 10 percent) while the directional dependency for low energy levels is great. The instrument has an estimated degree of error of less than + or - 20 percent. The intensimeter is small and easy to carry. Measurements are read on a logarithmic gauge which covers the instruments two ranges, 1mRh to 1000mRh. The intensimeter has two GM tubes, one for high, one for low activity.

21575 (HMI-B—246) **CAMAC instrumentation for monitoring and control of the VICKSI accelertaors - description of the CAMAC and auxiliary equipment.** Busse, W.; Kluge, H.; Bosch, A.; Herdam, G.; Klessmann, H.; Martini, M.; Wawer, W. (Hahn-Meitner-Institut fuer Kernforschung Berlin G.m.b.H. (Germany, F.R.)). Dec 1977. 209p. (In German and English). NTIS (US Sales Only), PC A11/MF A01. Order Number DE83900906.

Descriptions are given for CAMAC system units, modules for interfacing peripheral devices, test equipment, and special peripherals and auxiliary equipment. (GHT)

21576 (INFN/TC—82/9) **Triple majority coincidence with four inputs.** Castoldi, M. (Istituto Nazionale di Fisica Nucleare, Genoa (Italy)). 16 Jun 1982. 6p. (In Italian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83900839.

A description is given for a variable majority coincidence module and circuitry design for use at the Genoa section of the Italian National Nuclear Physics Institute. 3 figures.

21577 (INW—8104) **A particle spectrometer with a large geometric factor for the energy range 0.1 to 30 keV.** Urban, A. (Graz Univ. (Austria)). Apr 1981. 22p. NTIS, PC A02/MF A01.

The design and the calibration of a detector using a channel electron multiplier (CEM) together with a spherical electrostatic analyzer are described. The CEM characteristic equivalent energy band widths, opening angles, and sensitive areas are defined and are given as functions of energies between 0.1 to 25 keV. The analyzer deflection high voltage, the CEM acceleration high voltage, the measurement control unit and the data processing interfaces are described. The numerical analysis of the geometric factor from the calibration data is demonstrated. Energy and pitch angle distribution of energetic electrons were measured. The 90 deg sensor detects a constant energy spectrum over the entire period, while the 30 deg sensor exhibits large variations. Changes in trapped particle pitch angle distribution (from isotropic at 154 to 156 sec flight time to anisotropic above 157 sec at the lowest and highest energies) explains the variations. (ESA)

21578 (LA—9572-C-Vol.2, pp 593-601) **Liquid time projection chamber.** Mahler, H.J.; Doe, P.J.; Chen, H.H. (California Univ., Irvine). Nov 1982. NTIS, PC A17/MF A01. Contract AM03-76SF00010.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

The liquid time projection chamber (TPC), like its gas counterpart, allows three-dimensional imaging of charged particle trajectories by drifting the ionization electron trails in a homogeneous electric field into a readout plane where the arriving charge is amplified and digitized as a function of time. Segmentation of this readout plane provides two transverse coordinates, while the the drift time provides the third coordinate parallel to the electric field. This principle is shown in the case of our two-dimensional liquid argon TPC. The collected charge provides energy and/or dE/dX information, and many of the TPC liquids are also excellent scintillators. Since the liquid TPC is totally sensitive and it can be very massive, it may be an ideal detector for experiments searching for rare decays, e.g. nucleon decay, $\beta\beta$-decay, etc., or in neutrino experiments at accelerators, meson factories, reactors, as well as with solar or cosmic ray neutrinos. In these cases, the detector medium is either the source or the target of the investigated process.

21579 (LA-UR—83-290) **Los Alamos portable beta-ray spectrometer.** Erkkila, B.H.; Brake, R.J.; Waechter, D.A. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 8p. (CONF-830204—4). NTIS, PC A02/MF A01. Order Number DE83007575.

From International beta dosimetry symposium; Washington, DC, USA (15 Feb 1983).

The integration of a beta-ray detector to multichannel analyzer (MCA) and computer has resulted in a portable spectrometer for studying beta rays in the field. The present detector is a 5 cm diameter by 2 cm thick plastic scintillator manufactured by Bicron, Inc. Other detectors can easily be integrated into the package. The integral instrument package is 15 cm wide by 15 cm high by 25 cm long and weighs less than 10 pounds. Internal rechargeable batteries for 8 hours of field operation are included. The instrument contains a detector, an amplifier, a multichannel analyzer, and a liquid crystal display (LCD). A microprocessor controls all the functions of the instrument and is programmed to display all necessary information and 128-channel spectra on the LCD.

21580 **(LA-UR—83-424) BGO in several satellite-borne applications.** Klebesadel, R.W. (Los Alamos National Lab., NM (USA)). 1982. Contract W-7405-ENG-36. 19p. (CONF-821160—2). NTIS, PC A02/MF A01. Order Number DE83007560.

From International workshop on bismuth germanate; Princeton, NJ, USA (10 Nov 1982).

An experiment is being prepared to be flown on a NASA/NOAA TIROS satellite. Named DOEE-1 (Department of Energy Experiment), it will carry a segmented 2.7" x 3" BGO (Bismuth Germanate) scintillator. Sufficient telemetry will be provided to evaluate the performance exhaustively during a long exposure in space. Another instrument including a BGO scintillator, named SEE (Spectrometer for Energetic Electrons), has been operating at synchronous altitude since 1979, providing measurements of electron fluxes at $2.5 \leqq E \leqq 9$ MeV. Unfortunately, the data are not suitable for a critical evaluation of the BGO scintillator performance, since scintillator response is not directly monitored.

21581 **(N—82-26068) An imaging gas scintillation proportional counter for the detection of subkiloelectron-volt x-rays.** Hailey, C.J.; Ku, W.H.M.; Vartanian, M.H. (Columbia Univ., New York (USA)). Nov 1981. 18p. NTIS, PC A99/MF A01.

In NASA. Goddard Space Flight Center X-ray Astronomy in the 1980's p 301-318 (SEE N82-26055 16-88) REFS.

A large area imaging gas scintillation proportional counter (IGSPC) was constructed for use in X-ray astronomy. The IGSPC consists of a gas scintillation proportional counter (GSPC) with a micron polyprotylene window coupled to a multiwire proportional counter (MWPC) via a calcium fluoride window. Over a sensitive area of 21 cu cm the instrument has a measured energy resolution of 17.5% (FWHM) and 1.9 mm (FWHM) spatial resolution at 1.5 keV.

21582 **(N—82-26074) A diffuse soft x-ray spectrometer.** McCammon, D. (Wisconsin Univ., Madison (USA)). Nov 1981. 23p. NTIS, PC A99/MF A01.

In NASA. Goddard Space Flight Center X-ray Astronomy in the 1980's p 379-401 (SEE N82-26055 16-88) REFS.

A design for a diffuse X-ray spectrometer utilizing Bragg reflection is described. The geometry has a very high throughput for a given physical size and allows simultaneous observation at all wavelengths within its range. Spectral resolving power is about 35 to 50. A similar unit equipped with thallium acid pthallate crystals will cover the 11 - 24 A-range with about half this throughput and twice the resolving power.

21583 **(N—82-36081) High-resolution iron-line spectroscopy.** Griffiths, R.E. (Harvard Univ., Cambridge, MA (USA). Center for Astrophysics). Nov 1981. 26p. NTIS, PC A99/MF A01.

In NASA. Goddard Space Flight Center X-ray Astronomy in the 1980's p 497-522 (SEE N82-26055 16-88) REFS.

Methods of resolving the iron lines, the most common X-ray emission lines in both galactic and extragalactic X-ray sources, are reviewed. A self-focussing crystal spectrometer is shown to be the most suitable instrument, and the optimum crystal geometry is spherical (Schnopper and Taylor 1980). The principles of operation of such a spherical crystal imaging spectrometer are examined and its sensitivity is shown to be two orders of magnitude better than a focal plane crystal spectrometer on AXAF. A Spacelab version of this payload would be very cost-effective.

21584 **(PB—82-236563) High resolution alpha spectroscopy by liquid scintillation techniques. Master's thesis.** Coombs, E.G. (Maine Univ., Orono (USA)). Aug 1980. 47p. NTIS, PC A03/MF A01.

The use of high-resolution liquid scintillation spectroscopy is described as an inexpensive and rapid method for the determination of radium-226 (an identified health hazard) and other alpha-emitting radionuclides in environmental water samples. Procedures are reported for measuring radium-226, uranium-238, and uranium-234, affording positive identification, high sensitivity due to pulse shape discrimination, and rapid sample preparation. No environmental water samples examined were found to have measurable levels of radium-226. Nonetheless, radium-226 can be detected, measured, and positively identified down to a level of 4 pCi/liter, with a recovery efficiency of 47%. The method was optimized for environmental radiation measurements by: optimizing the energy resolution; reducing the background by use of pulse shape discrimination; and optimizing the scintillation fluor. Since the extractant used will extract any actinide series element, the instrumentation and techniques developed can be applied to other areas (e.g., measurement of plutonium and uranium in environmental effects studies of the nuclear fuel cycle). Measurements of the polonium 218, 214, and 210 isotopes, and radon-222, were also made. With the present energy resolution, an alpha energy identification to within 0.4 MeV is possible.

21585 **(PB—82-253881) A high throughput inelastic neutron scattering spectrometer for the Harwell linac and the spallation neutron source.** Richardson, R.M. (Science and Engineering Research Council, Chilton (UK). Rutherford Appleton Lab.). [nd]. 77p. NTIS, PC A05/MF A01.

The detailed scientific design of a High Throughput Inelastic Spectrometer (HTIS) is presented. Methods of calculating resolutions and intensities for inverse geometry inelastic scattering spectrometers are discussed and an exact method (based on lineshape calculations) is presented. This is used in the discussion of the choice of design parameters for a beryllium filter analyzer with the HTIS installed at the Harwell linac. The changes necessary for the eventual installation at the Spallation Neutron Source are also indicated. (Copyright (c) Science and Engineering Research Council 1982.)

21586 **(PB—83-112557) Preliminary testing of a prototype portable x-ray fluorescence spectrometer. Information circular.** Patten, L.L.; Anderson, N.B.; Stevenson, J.J. (Bureau of Mines, Denver, CO (USA). Intermountain Field Operation Center). Aug 1982. 39p. NTIS, PC A03/MF A01.

The Federal Bureau of Mines participated with the National Aeronautics and Space Administration and Martin Marietta Aerospace in developing, building, and testing a portable X-ray fluorescence spectrometer for use as an analyzer in mineral-resource investigative work. The prototype battery-powered spectrometer, measuring 11 by 12 by 5 inches and weighing only about 15 pounds, was designed specifically for field use. The spectrometer has two gas-proportional counters and two radioactive sources, (109)Cd and (55)Fe. Preliminary field and laboratory tests on rock specimens and rock pulps have demonstrated the capability of the spectrometer to detect 33 elements, to date. Characteristics of the system present some limitations, however, and further improvements are recommended.

21587 **(PNL-SA—10638) Beta-particle measurement and dosimetry at NRC-licensed facilities.** Rathbun, L.A.; Fox, R.A.; Roberson, P.L.; Scherpelz, R.I. (Pacific Northwest Lab., Richland, WA (USA)). Jan 1983. Contract AC06-76RL01830. 18p. (CONF-830204—6). NTIS, PC A02/MF A01. Order Number DE83007841.

From International beta dosimetry symposium; Washington, DC, USA (15 Feb 1983).

Recent experience indicates that beta-radiation fields in nuclear power reactors, fuel fabrication facilities and uranium mills are probably not being accurately monitored by instruments routinely used for this purpose. The Radiological Sciences Department, Pacific Northwest Laboratory is engaged in a project to define the extent of this beta-monitoring problem and to determine whether the performance of beta-monitoring field instruments and dosimeters can be predicted from calibration data. The initial phase of this work consists of characterizing the beta fields at several NRC-licensed facilities. This is accomplished with a silicon surface barrier detector and multi-element dosimeters. Based on the data and experience gained during characterization work, laboratory beta fields are set up for calibration of silicon detectors, field survey meters and dosimeters. All these devices are then returned to field environments where their performance can be further assessed.

21588 (PNL-SA—10656-A) **Performance testing of beta dosimeters used at Department of Energy facilities.** Roberson, P.L.; Holbrook, K.L.; Pappin, J.L. (Pacific Northwest Lab., Richland, WA (USA)). Jan 1983. Contract AC06-76RL01830. 8p. (CONF-830204—5). NTIS, PC A02/MF A01. Order Number DE83007846.

From International beta dosimetry symposium; Washington, DC, USA (15 Feb 1983).

A performance test based on the American national draft standard N13.11 was conducted for dosimeter systems in use at Department of Energy facilities. The large differences in dosimeter response found were due to use of different calibration source standards and different dosimeter designs. Differences in ^{90}Sr/^{90}Y calibrations were approximately 20% or less for all but one participant. The differences observed were attributed to variable thicknesses of dosimeter elements and variable source irradiation geometries. Improved beta calibration standards will result if irradiation specifications include acceptable ranges from the depth-dose characteristics. The low-energy beta responses observed were consistent with the thicknesses of dosimeter sensitive elements and overlying filtration.

21589 (PNL-SA—10670) **Application of a multi-element beta dosimeter.** Scherpelz, R.I.; Endres, G.W.R.; Roberson, P.L. (Pacific Northwest Lab., Richland, WA (USA)). Jan 1983. Contract AC06-76RL01830. 12p. (CONF-830204—8). NTIS, PC A02/MF A01. Order Number DE83007845.

From International beta dosimetry symposium; Washington, DC, USA (15 Feb 1983).

A passive beta dosimeter has been developed at the Pacific Northwest Laboratory (PNL) to more accurately account for the beta energy distribution in the radiation field. This dosimeter uses TLD chips placed under shields of varying thicknesses. Each shield attenuates the beta radiation to some degree, depending on the thickness of the shield. An indication of the beta energy spectum can therefore be obtained by examining the relative responses of the TLDs under the different shields. This indication of the spectrum allows the selection of the appropriate energy-dependent calibration factor for converting TLD response to dose. A number of these multi-element dosimeters have been exposed in unknown fields of mixed gamma and beta radiation, and doses for both radiation components have been determined.

21590 (PNL-SA—10714, pp 19-27) **Procedures for calibrating neutron personnel dosimeters.** Schwartz, R.B.; Eisenhauer, C.M. (National Bureau of Standards, Washington, DC). Dec 1982. NTIS, PC A11/MF A01.

From 9. DOE workshop on personnel neutron dosimetry; Las Vegas, NV, USA (24 Jun 1982).

In this chapter the philosophy behind some of the procedures for calibrating dosimeters are discussed and examples of their use are given. The main topic of this report deals with corrections for scattering effects, primarily for scattering from the surfaces of the calibration room.

21591 (PNL-SA—10714, pp 28-37) **Gamma-ray component from a Cf fission source.** Eisenhauer, C.M.; Schwartz, R.B. (National Bureau of Standards, Washington, DC). Dec 1982. NTIS, PC A11/MF A01.

From 9. DOE workshop on personnel neutron dosimetry; Las Vegas, NV, USA (24 Jun 1982).

The gamma-ray component of reactor and radioactive neutron sources is often significant. In this paper the measurement of gamma-ray component of bare and moderated Cf spontaneous fission neutron sources is described.

21592 (PNL-SA—10714, pp 38-48) **Background and neutron response of electrochemically etched CR-39.** Cross, W.G.; Arneja, A.; Ing, H. (Chalk River Nuclear Labs., Ontario). Dec 1982. NTIS, PC A11/MF A01.

From 9. DOE workshop on personnel neutron dosimetry; Las Vegas, NV, USA (24 Jun 1982).

This paper is concerned with some results obtained for track densities in CR-39 plastic - particularly those obtained by electrochemical etching - after irradiation with alpha particles and neutrons of various energies.

21593 (PNL-SA—10714, pp 49-58) **Measurement of neutron field reference data using a standardized single sphere albedo technique.** Piesch, E.; Burgkhardt, B. (Karlsruhe Nuclear Research Center, Germany). Dec 1982. NTIS, PC A11/MF A01.

From 9. DOE workshop on personnel neutron dosimetry; Las Vegas, NV, USA (24 Jun 1982).

In stray neutron fields the single sphere albedo technique was found to be a suitable method to establish dose equivalent reference values and appropriate field calibration factors for albedo dosemeters. With respect to a more complete interpretation of the actual neutron field the on-lie computer evaluation techniques was extended and improved in order to become a standardized technique in area monitoring. On the basis of fluence response functions now well established for the 30 cm sphere and the albedo detector, the new evaluation technique allows one to estimate actual field data in terms of neutron fluence absorbed dose, dose equivalent, fluence-to-dose conversion factors and effective quality factor.

21594 (PNL-SA—10714, pp 59-67) **Universal albedo neutron dosemeter combined with a track etch detector.** Piesch, E. Burgkhardt, B.; Hassib, G.M. (Karlsruhe Nuclear Research Center, Germany). Dec 1982. NTIS, PC A11/MF A01.

From 9. DOE workshop on personnel neutron dosimetry; Las Vegas, NV, USA (24 Jun 1982).

The two component albedo neutron dosemeter allows for the separate measurement of thermal field neutrons and thermal albedo neutrons. A recently developed boron plastic capsule was optimized with respect to the detector-to-phantom distance and fitted for universal use of various commercial TLD cards. In combination with CR-39 or polycarbonate track etch detectors the neutron field can be analyzed for personnel monitoring purposes.

21595 (PNL-SA—10714, pp 74-84) **Effects of additives and impurities on the properties of CR-39 neutron dosimeters.** Tarle, G. (Univ. of California, Berkeley). Dec 1982. NTIS, PC A11/MF A01.

From 9. DOE workshop on personnel neutron dosimetry; Las Vegas, NV, USA (24 Jun 1982).

Several problems have plagued users of commercial CR-39 for neutron dosimetry work. Large variations in sensitivity have been observed in samples received from different manufacturers, from different batches from the same manufacturer and even within a given sheet. The latter variations have taken several forms. Clear etching regions of lower sensitivity near the gasket and sometimes extending well away from the gasket in drip-like patterns have been observed. Large demarcated patches of differing sensitivity and sensitivity variations with depth have been found in many commercial samples of CR-39. In addition, we have observed a general roughening of the post-etch surface and a patchiness of bulk etching associated with contact patterns of adjacent sheets, which have been stored for extended (≧ 6 mos) periods of time. All of these problems combine to make commercially available CR-39 unreliable as a neutron dosimeter. In an attempt to identify and correct the causes of these problems, a systematic study of the effects of additives, impurities and manufacturing conditions on the uniformity of CR-39 track detectors has been undertaken, and is reported in this paper.

21596 (PNL-SA—10714, pp 85-91) **Characterization and control of a model CR-39 polymer.** Huang, S.J.; Johnson, J.F. (Univ. of Connecticut, Storrs). Dec 1982. NTIS, PC A11/MF A01.

From 9. DOE workshop on personnel neutron dosimetry; Las Vegas, NV, USA (24 Jun 1982).

The purposes of this study on CR-39 polymer are twofold: (1) the preparation of an uncrosslinked model polymer which closely approximates half of the CR-39 polymer. This polymer will be used for studies of the degradation of the carbon main chains of the CR-39 polymer caused by high energy radiation; and (2) to stdy the conventional CR-39 polymerization process variables which control the extent of allyl chains without adding additional chain stoppers. This will hopefully permit preparation of a material that is better for use in dosimetry than the currently available materials.

21597 (PNL-SA—10714, pp 92-102) **Spectroscopy and dosimetry of fast neutrons in the energy range (0.5 - 15) MeV using CR-39.** Faermann, S. (Soreq Nuclear Research Centre, Yavne, Israel); Eisen, Y.; Schlesinger, T.; Ovadia, E.; Kushilevski, A. Dec 1982. NTIS, PC A11/MF A01.

From 9. DOE workshop on personnel neutron dosimetry; Las Vegas, NV, USA (24 Jun 1982).

The CR-39 plastic detector which was discovered to be sensitive to fast neutrons above approximately 300 keV, showed itself to be a preferable high energy neutron dosimeter over polycarbonate foils and undoubtedly over NTA films. Damage sites caused mainly by proton recoil are revealed by means of chemical or electrochemical etching techniques. In a recent study, it was shown that the response of a CR-39 foil with a polyethylene radiator in front of it is not rem equivalent in the (0.5 - 15) MeV energy region. This response peaks near 2 MeV and falls to either direction by up to a factor of five if electrochemical etching is applied. The aim of the present study was to use spectroscopic means to flatten the energy response of the CR-39 detector. The inherent additional advantages of such a spectrometer-dosimeter could be applied in the growing field of high energy neutron radiotherapy and for possible assessment of the neutron spectrum in the fusion reactor blankets.

21598 (PNL-SA—10714, pp 103-119) **Progress on development of a passive, personnel neutron dosimetry/spectrometer - DOSPEC.** Griffith, R.V.; McMahon, T.A. (Lawrence Livermore National Lab., CA). Dec 1982. NTIS, PC A11/MF A01.

From 9. DOE workshop on personnel neutron dosimetry; Las Vegas, NV, USA (24 Jun 1982).

The advantages of a multi-component, passive personnel neutron dosimeter have been discussed over recent years. The combination of components (TLD albedo and different types of track detectors) conceptually provides valuable information about radiation field characteristics that would not be available using a singe detector. Although there is more work required to prepare, issue, process, and analyze a multicomponent dosimeter, much of the potential extra effort can be avoided by selective processing of dosimeter components. The components we have selected for use in the DOSPEC I dosimeter are TLD albedo, and 3 track etch, plastic detectors - CR-39 carbonate, polycarbonate, and LR115 (a cellulose nitrate). The TLD chips (TLD 600 and 700) are processed with conventional techniques and equipment used for photon dosimetry. The plastics are etched chemically. Track counting can be done semi-automatically using a commercial bacterial colony counter, mated to an optical microscope. Each of the four components has a sufficiently different neutron energy response that proper comparisons of responses provides some simple spectral information.

21599 (PNL-SA—10714, pp 154-161) **Personal neutron dosimeter.** Tyree, W.H.; Falk, R.B. (Rockwell International, Golden, CO). Dec 1982. NTIS, PC A11/MF A01.

From 9. DOE workshop on personnel neutron dosimetry; Las Vegas, NV, USA (24 Jun 1982).

A personal electronic neutron dose equivalent meter includes a neutron proton converter for providing an electrical signal having a magnitude proportional to the energy of a detected proton produced from the converter, a pulse generator circuit for generating a pulse having a duration controlled by the weighted effect of the amplitude of the electrical signal, an oscillator enabled by the pulse for generating a train of clock pulses for a longer time dependent upon the pulse length, a counter for counting the clock pulses, and an indicator for providing a direct reading and aural alarm when the count indicates that the wearer has been exposed to a selected level of neutron dose equivalent. Data are included that describe the development of the hybrid circuits electrical performance, background radiation response, gamma response, and neutron response from a californium-252 source.

21600 (PNL-SA—10714, pp 162-168) **Portable neutron spectrometer/dosimeter.** Erkkila, B.H.; Waechter, D.A.; Vasilik, D.G. (Los Alamos National Lab., NM). Dec 1982. NTIS, PC A11/MF A01.

From 9. DOE workshop on personnel neutron dosimetry; Las Vegas, NV, USA (24 Jun 1982).

A portable neutron spectrometer/dosimeter has been developed at Los Alamos. The instrument mates a tissue-equivalent LET detector manufactured by EG & G to an electronic package developed in the Health Division at the Los Alamos National LAboratory. The instrument includes 5-hour lifetime batteries and weighs about 8 lb. The overall dimensions are 25 cm long by 15 cm wide by 15 cm high. The elctronics include a high voltage power supply, a 128-channel pulse height analyzer, a liquid crystal display, and a microcomputer system to calculate dose and dose rate from neutrons incident on the neutron detector. Several displays are available which include an LET spectrum and dose spectra as a function of keV per micron in the display. The integrated dose and the dose rate can also be displayed.

21601 (PNL-SA—10714, pp 169-179) **Neutron dosimeters based on hydrogenous materials.** Brackenbush, L.W. (Pacific Northwest Lab., Richland, WA). Dec 1982. NTIS, PC A11/MF A01.

From 9. DOE workshop on personnel neutron dosimetry; Las Vegas, NV, USA (24 Jun 1982).

All existing personnel neutron dosimeters suffer from a common problem - all have an energy response problem. Ideally, the dosimeters' response should match that of tissue. Protons generated by the elastic scatter of neutrons are the major source of neutron dose for almost all practical neutron energies. It is believed that a dosimeter incorporating hydrogen and reacting to the energy transferred from proton recoils would greatly reduce the energy dependence problem. At slow neutron energies, energy is transferred to tissue by N(n,p)C and H(n,γ)D reactions. Incorporating nitrogen into the dosimeter material may help the energy dependence problem at low neutron energies. Three areas of research were investigated: the reported change of conductivity of cellulose acetate under neutron irradiation; organic semiconductors; and other hydrogenous materials. All of these devices rely upon hydrogen to affect changes in the materials.

21602 (PNL-SA—10714, pp 180-185) **Applications of resonance ionization spectroscopy in neutron dosimetry.** Whitaker, T.J.; Hurst, G.S. (Atom Sciences, Inc., Oak Ridge, TN). Dec 1982. NTIS, PC A11/MF A01.

From 9. DOE workshop on personnel neutron dosimetry; Las Vegas, NV, USA (24 Jun 1982).

Resonance Ionization Spectroscopy (RIS) is a new analytical technique which is orders of magnitude more sensitive than previous methods of atomic analysis. In this method, lasers are used to selectively excite specific electronic transitions in the element being analyzed. A second laser photon can then ionize the excited atoms. Commercial lasers have sufficient intensity to assure that every atom located in the central portion of the laser beam will be ionized, and therefore can be detected. In this paper the concept of a xenon-containing matrix (XCM) which would release xenon atoms when exposed to neutrons is explored. Accumulated xenon would be measured using RIS to determine total dose. The total dosimeter would consist of an XCM, a radiator, and an encapsulation around both to contain released xenon atoms.

21603 (PNL-SA—10714, pp 186-192) **Radiochromic waveguides for sensitive neutron and gamma dosimetry.** Kronenberg, S. (Army Electronics Tech. and Devices Lab., Fort Monmouth, NJ). Dec 1982. NTIS, PC A11/MF A01.

From 9. DOE workshop on personnel neutron dosimetry; Las Vegas, NV, USA (24 Jun 1982).

Utilizing ionizing radiation induced changes (by anomalous dispersion) in the index of refraction in radiochromic dyes actually yields four different systems of radiochromic waveguide dosimeters. These four cases are discussed in this paper.

21604 (PNL-SA—10714, pp 193-216) **New laser technique revives old ideas for thermoluminescence neutron dosimetry.** Braeunlich, P. (Washington State Univ., Pullman); Brown, M.; Gasiot, J.; Fillard, J.P. Dec 1982. NTIS, PC A11/MF A01.

From 9. DOE workshop on personnel neutron dosimetry; Las Vegas, NV, USA (24 Jun 1982).

Laser heating is discussed as a means to evaluate thermoluminescence dosimeters in neutron dosimetry. Direct energy coupling from the photon beam to the phonons of the TL material permits heating of thin layers with rates of temperature increase exceeding 10^4 Ks^{-1}. Rapid TLD evaluation will allow the design of dosimetry badges containing a number of different small thin film TLD elements in various orientations and behind appropriate filters, hydrogenous radiators, etc. Desired redundance is readily possible by using back-up TLDs for every specific task. Reading occurs with a scanning laser beam rather than by mechanically manipulating the TLD toward a fixed heat source. Improvements in the signal-to-noise ratio of up to a factor of 1000 are readily obtained. Thus, sensitive thin-film TLDs can be designed with negligible self-shielding for thermal neutrons in albedo applications and with known, nearly energy dependent cavity correction factors for dosimetry in mixed n-γ fields. Due to the greatly increased sensitivity possible with fast laser heating, significant advances are expected in the fast neutron dosimetry techniques which are based on hydrogeneous proton radiators or LET-dependent slow peak formation.

21605 (PNL-SA—10714, pp 217-225) **Personnel neutron dosimetry by a combied method of decoration and electrochemical etching.** Espinosa, G. (Instituto de Fisica, Mexico City, Mexico); Moreno, A.; Golzarri, J.I.; Griffith, R.V. Dec 1982. NTIS, PC A11/MF A01.

From 9. DOE workshop on personnel neutron dosimetry; Las Vegas, NV, USA (24 Jun 1982).

A method for particle-track enlargement, background reduction and optical contrast enhancement in plastic detectors has been developed based on decoration with Rhodamine-B dye during ultrasonic etching. Alternative processing conditions and parameters have been evaluated experimentally, including pre-irradiation washing, etch duration, sensitization, and electrochemical etching. The plastics used include Triafol, Lexan, and CR-39. Using fission fragments we obtained track enlargement of 30% with significant improvement in contrast and visibility. The techniques are being developed for highly automated neutron dosimeter processing, including readout with a micro-densitometerand computer evaluation.

21606 (SLAC-PUB—2990) **New developments in segment ancillary logic for FASTBUS.** Walz, H.V.; Bertolucci, B. (Stanford Linear Accelerator Center, CA (USA)). Oct 1982. Contract AC03-76SF00515. 5p. (CONF-821011—48). NTIS, PC A02/MF A01. Order Number DE83007010.

From IEEE nuclear science symposium; Washington, DC, USA (20 Oct 1982).

Segment Ancillary Logic hardware for FASTBUS systems provides logical functions required in common by all devices attached to a segment. It controls the execution of arbitration cycles, and geographical address cycles, and generates the system handshake responses for broadcast operations. The mandatory requirements for Segment Ancillary Logic in the FASTBUS specifications are reviewed. A detaified implementation based on ECL logic is described, and the hardware to be used on an ECL cable segment for an experimental FASTBUS system at SLAC is shown.

21607 (SLAC-PUB—2991) **Progress on the SLAC SNOOP diagnostic module for FASTBUS.** Walz, H.V.; Gustavson, D.B.; Downing, R. (Stanford Linear Accelerator Center, CA (USA); Illinois Univ., Urbana (USA)). Nov 1982. Contract AC03-76SF00515. 3p. (CONF-821011—47). NTIS, PC A02/MF A01. Order Number DE83007009.

From IEEE nuclear science symposium; Washington, DC, USA (20 Oct 1982).

A SNOOP Diagnostic Module for FASTBUS is under development at SLAC. The SNOOP Module resides on a FASTBUS crate segment and provides diagnostic monitoring and testing capability. It consists of a high-speed ECL front-end to monitor and single-step segment operations, a simple master interface, and a control processor with two serial communication ports. Module features and specifications are summarized, and prototype hardware is shown.

21608 (SLAC-PUB—2994) **FASTBUS controller module using a multibus MPU.** Deiss, S.R. (Stanford Linear Accelerator Center, CA (USA)). Oct 1982. Contract AC03-76SF00515. 4p. (CONF-821011—46). NTIS, PC A02/MF A01. Order Number DE83007008.

From IEEE nuclear science symposium; Washington, DC, USA (20 Oct 1982).

The architecture, adaptability and performance of SLAC's single board controller module will be detailed. Example uses with an 8086 MPU and with a 68000 MPU will be given. Details of circuit design and software interface will be provided.

21609 (SLAC-PUB—3008) **Introduction to FASTBUS.** Logg, C.A. (Stanford Linear Accelerator Center, CA (USA)). Nov 1982. Contract AC03-76SF00515. 8p. (CONF-821201—13). NTIS, PC A02/MF A01. Order Number DE83007017.

From Fall DECUS US Symposium; Anaheim, CA, USA (6 Dec 1982).

FASTBUS is a standardized modular 32-bit data-bus system for performing data acquisition, data processing, and control in high energy physics and other applications. It has been developed by the Fast System Design Group of the U.S. NIM Committee. Presented here is an overview of the FASTBUS hardware specification, the operation of the FASTBUS protocol, the implications that the use of FASTBUS has for software systems, and some of the computer to FASTBUS interfaces developed to date.

21610 **Lithium-6 coated wire mesh neutron detector.** Young, C.A.; Geelhood, B.D. US Patent Application 6-381,099. 3 Jun 1982. 22p.

It is the primary object of the present invention to provide a lighter, more compact neutron detector of high sensitivity. It is a concomitant object of the present invention to disclose a thin lithium-6 based neutron detector which contains a large amount of useful lithium-6 within a relatively small detector volume. It is a further object of the present invention to disclose a lithium neutron detector in which the lithium detector portion is self supporting. It is another object of the present invention to disclose a lithium neutron detector which requires only one layer of counting wires for many layers of detectors. It is further object of the present invention to disclose a neutron detector that is easier to manufacturer than prior art designs.

21611 **Ionizing radiation dose monitor using silicon-on-sapphire transistor.** Srour, J.R.; Curtis, O.L.; Othmer, S.; Chen, S.C.C. US Patent Application 6-368,473. 14 Apr 1982. 9p.

A reusable solid state device is disclosed which monitors ionizing radiation. The device is a silicon-on-sapphire n-channel MOS transistor having a back-channel leakage current which is proportional to total radiation dose. To return the monitor to its original reusable state, the drain-to-source transistor bias is reduced to zero while irradiating the device to an appropriate dose level.

21612 **Calorimetry in high-energy physics.** Fabjan, C.W.; Ludlam, T. (CRN, Geneva, Switzerland). *Annual Review of Nuclear Science;* **32**: No. 1, 335-389(1982). Contract AC02-76CH00016.

A review of the design and applications of cascade detectors is presented. (AIP)

21613 (CAPE—2774) **Neutron REM survey meter (Engineering Materials).** (Lawrence Livermore National Lab., CA (USA)). 1982. Contract W-7405-ENG-48. (LLNL/MISC—4083-82). TIC. Order Number DE83005036.

Engineering drawings are given of a neutron survey meter with an energy dependence similar to the dose-equivalent curve. The survey meter is a hand-held, self-contained, count-rate-meter used in conjunction with a modified Andersson-Braun remmeter as the neutron detection device. The electronic portion of the meter is constructed in a cylindrical steel cabinet attached to one end of the polyethylene remmeter assembly. Electronic circuits feature CMOS integrated circuits for high reliability and low power drain. The power is provided by eight C size batteries. The meter is three and one-half inches in diameter (2.9 inch scale) and calibrated at 0 to 10 MILLIREM/H NEUTRONS, with battery checkmark. The meter range is multiplied by switch selectable factors of X0.1, X1, X10, X100. The detector is a Boron Trifluoride (BF_3) Neutron Proportional Counter type made by N. Wood. This Model G-10-2A is moderated by a modified Andersson-Braun remmeter (LLNL Dwg. No. AAA 77-110319-0A). The instrument is calibrated by LLNL Standards and Calibration Department to read 100% of the 2π geometry of Cf-252. The instrument dimensions are 21.6 centimetres diameter by 34.9 centimetres long (8.5 inches diameter by 13.75 inches long). The polyethylene remmeter has a suitcase-type handle on top and four rubber mounting feet on the bottom. Total weight of the assembly with batteries is 10.4 kilograms (22 pounds, 15 ounces). (WHK)

21614 **Superconducting toroidal particle detector for high-energy physics research.** Materna, P.; Bonanos, P.; Heitzenroeder, P.; File, J.; Pope, B. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 285-288(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A conceptual design is presented for a superconducting toroidal particle detector proposed to detect muons at the ISABELLE accelerator. The device features a clear central bore of 1 meter radius; a transparency factor (open space between coils) of 60%; and a relatively large integrated bending power of 3.5 T-m. The outside dimensions of the device are 15 m overall length and 10 m outside diameter. Magnetic fields and forces are analyzed, and the resulting stresses are shown to be well within allowable limits.

21615 **(CAPE—2763) Alpha Survey Meter (Engineering Materials).** (Lawrence Livermore National Lab., CA (USA)). 3 Apr 1978. Contract W-7405-ENG-48. TIC. Order Number DE83005774.

7 35 MM aperture cards.

The survey meter is a hand-held, self-contained count-ratemeter used in conjunction with the air proportional probe type LEA76-2009 to survey for alpha particle contamination ranging from a few counts per minute to 10^6 counts per minute. The unit is constructed in a light weight aluminum case protected with blue epoxy paint. Electronic circuits feature CMOS integrated circuits for high reliability and low power drain. The power is provided by eight size C batteries. The meter is a three and one-half inch meter (2.9 inch scale) calibrated 0-100 counts/min with battery check mark. The detector is an air proportional probe type LEA76-2009 with active area of 120 cm^2. The calibration is by LLL Standards to read 100% of 2π geometry of ^{239}Pu. The calibration is sensitive to changes in air pressure. (WHK)

21616 **(CAPE—2804) SAM SLAVE CAMAC Analog Branch Mark III SPEAR (Engineering Materials).** (Stanford Linear Accelerator Center, CA (USA)). [nd]. Contract AC03-76SF00515. TIC. Order Number DE83006215.

The Logic Diagram delineates the basic logic of the SAM (SLAVE ANALOG MODULE) SLAVE CAMAC Analog Branch. This device can only be used with and a complement to the SPORT (Smart Port) normally used with the SLAC BADC (Brilliant Analog to Digital Converter). SAM is the receiving module for SPORT and cannot stand alone. This device is used extensively at SLAC on the Mark III detector at SPEAR.

21617 **(CAPE—2802) Mark III Asynchronous Console Interface (Engineering Materials).** (Stanford Linear Accelerator Center, CA (USA)). [nd]. Contract AC03-76SF00515. TIC. Order Number DE83006214.

The Drawing List DL 135-687-00-RO and the three other drawings listed provide partial data and specifications for construction of the SLAC Mark III Asynchronous Console Interface unit. This device is a special CAMAC interface to allow ASCII (American Standard for Computer Information Interchange) access to a computer. This device is essentially a keyboard and is a serial port system. The drawing list has 22 drawings listed, 4 of which are provided here.

21618 **(CAPE—2803) SPORT-SPEAR Mark III Electronics (Engineering Materials).** (Stanford Linear Accelerator Center, CA (USA)). [nd]. Contract AC03-76SF00515. TIC. Order Number DE83006216.

The Drawing List DL 135-678-00-RO and the drawings listed thereon provide the specifications for construction of the SPORT-SPEAR Mark III Electronics. SPORT stands for Smark Port. This device is an adapter for the SLAC BADC (Brilliant Analog to Digital Converter) providing up to 5 ports whereas the BADC and SPORT takes signals from experimental equipment and directs them to other equipment and micro computers for processing and storing. These units are housed in standard Camac crates.

21619 **(CAPE—2688) Crate verifier module (Engineering Materials).** (Stanford Linear Accelerator Center, CA (USA)). [nd]. Contract AC03-76SF00515. TIC. Order Number DE83006213.

The Drawing List DL 135-267-00R0 and the drawings listed thereon provide the data and specifications to construct the SLAC Crate Verifier Module as used on the SPEAR Mark III Detector. This unit is a diagnostic device which scans the backplane of a CAMAC crate to record information and analyze the data to determine if the crate is working properly.

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REFER ALSO TO CITATION(S) 21355

21620 **(AD-A—118864/8) MNOS/SOS radiation hardness performance and reliability study. Interim report Aug 79-Aug 80.** Hampton, F.L.; Cricchi, J.R. (Westinghouse Defense and Electronic Systems Center, Baltimore, MD (USA). Advanced Technology Labs.). May 1982. 165p. NTIS, PC A08/MF A01.

In this investigation the endurance-retention characteristics of fast-write MNOS memory structure, and radiation tolerance of metal-gate dual-dielectric and polysilicon-gate all-oxide devices have been evaluated. Writing and clearing speed have been studied with respect to the NH3:SiH4 ratio (APCVD), and NH3:SiC12H2 ratio (LPCVD). The films deposited with a low NH3:SiC12 ratios could be written and cleared with shorter pulse widths; however, a degradation in retention was observed. An improvement in the endurance retention product of a drain source protected transistor structure has been realized by oxidizing the memory nitride followed by an H2 anneal immediately after deposition. The film was deposited with a LPCVD reactor at 750 deg with a NH3:SiC12H2 ratio of 9:1. Oxidation was performed in steam at 900 C, as was the subsequent H2 anneal. The effect of total dose radiation was found to be more severe for a positive bias. The all oxide polysilicon gate transistor structures were observed to be relatively soft, however results from capacitor structures shows promise in developing a radiation tolerant polysilicon-gate all-oxide gate structure.

21621 **(UCRL—88702) High-power microwave-pulse susceptibility of discrete semiconductor devices.** McConaghy, C.F.; Martin, L.C.; Yee, J.H. (Lawrence Livermore National Lab., CA (USA)). 1983. Contract W-7405-ENG-48. 6p. (CONF-830314—2). NTIS, PC A02/MF A01. Order Number DE83007353.

From 2. national conference on high power microwave technology; Adelphi, MD, USA (1 Mar 1983).

This paper describes work in process in the investigation of the susceptibility of semiconductor devices to short pulses of microwave energy. This investigation includes a combination of testing, circuit modeling, and basic physics modeling. The testing includes both unipolar (video) and microwave (GHz range) pulses in the nanosecond time regime. Modeling is oriented toward the explanation of second-breakdown phenomena and the development of a breakdown level prediction model. Preliminary results have been obtained for the 2N918 transistor.

21622 **Effect of high energy neutrons on a microchannel plate detector.** Persing, R.; Medley, S.S. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1086-1089(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The response of a chevron microchannel plate (MCP) to high energy neutrons was measured to be 0.17% for 2.5 MeV-DD neutrons and 0.64% for 15 MeV-DT neutrons. The higher response measured for the 14 MeV-DT neutrons is attributed to background gamma radiation or 'contamination' induced by neutron collisions with materials located between the neutron source and the MCP detector. Due to their lower energy, the 2.5 MeV-DD response measurements are expected to be relatively free of gamma contamination and hence, indicative of the actual response of a MCP detector to neutrons in the 1-10 MeV energy range.

21623 Neutron- and gamma-induced transient effects in optical fibers. Lyons, P.B. (Los Alamos Scientific Lab., NM); Looney, L.D.; Golob, J.; Robichaud, R.; Seno, R.; Madrid, J.; Hocker, L.; Nelson, M. pp 379-392 of Fiber optics: advances in research and development. Bendow, B.; Mitra, S.S. (eds.). New York, NY; Plenum Publishing Corp. (1979).

Both luminescence and absorption are observed when optical fibers are exposed to ionizing radiation. Potential applications of optical fibers include data transmissions in the presence of radiation and an understanding of radiation effects on fibers is therefore critical. Many previous investigations have studied transient radiation effects using pulsed electron and x-ray beams and long term effects using x-ray, gamma, electron, and neutron sources. However, no data for neutron-induced transient phenomena have been obtained to date. Since neutron bombardment will result in atomic displacement to a greater extent than electron sources, it is not a priori evident that neutron and electron absorption effects are similar. Furthermore, since luminescence has been shown to be mainly of Cerenkov orgin, neutron induced luminescence should be significantly less, on an absorbed dose basis, than electron induced luminescence. The experimental data presented herein are the first neutron-induced transient absorption and luminescence measurements on optical fibers.

4403 Miscellaneous Instruments

REFER ALSO TO CITATION(S) 19850, 19968, 20344, 21086, 21515, 22049, 22172

21624 (ANL/NESC—464R) DYNO1; photomultiplier electron distribution. Edwards, J.E.; McCarthy, J.F. (Knolls Atomic Power Lab., Schenectady, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048464.

Maxima of - 4 stages 10,000 electrons for which probabilities will be calculated; Source decks (6600-157 cards, 360-161 cards) Sample problems (6600-5 cards, 360-7 cards) Reference report, KAPL-M-6575.

DYNO1 calculates the distribution of electrons that are emitted from a photomultiplier composed of a series of dynodes.CDC6600;IBM360; FORTRAN IV; SCOPE (CDC6600) and OS/360 (IBM360); About 45,000 words of memory.

21625 (CONF-821227—1) Focusing and imaging sharp line x-ray and gamma-ray sources using variable-metric diffraction crystals. Smither, R.K. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 24p. NTIS, PC A02/MF A01. Order Number DE83007789.

From 11. Texas symposium on relativistic astrophysics; Austin, TX, USA (12 Dec 1982).

A new method has been devised for focusing and imaging the radiation from sharp-line sources of x-rays and gamma-rays, which makes use of variable-metric diffraction crystals. A variable-metric diffraction crystal is one in which the spacings between the crystalline planes is varied as a function of position in the crystal by either the application of a thermal gradient or by changing the composition of a two component or multiple component crystal. This change in planar spacing changes the Bragg diffraction angle for monochromatic radiation as a function of position in the crystal and makes it possible to obtain focusing and in some cases imaging of a sharp-line point source or parallel beam source. This new approach to focusing x-rays and gamma-rays is used to design a number of gamma ray telescopes suitable for focusing the 511 keV annihilation radiation from the strong source of the center of our galaxy. The new designs are surprisingly efficient with approximately 20% of the radiation incident on the variable-metric diffraction crystals being focused on the image spot. Crystals of Ge, Ge + Si, Si, and quartz are used with mosaic widths of 10 arc sec. The size of the telescope can be scaled up or down without affecting the angular resolution or the energy resolution. The largest model described is 50 m long and has 10 crystal diffraction ring assembles with radii between 71 and 200 cm. The total area of the diffraction crystal is 24,610 cm^2 and the effective area (total x diffraction coefficient x transmission) is 4745 cm^2. An example of a smaller telescope is also given that is only 12.5 m long and has an effective area of 297 cm^2.

21626 (N—82-24260) Operating principles of optico-electronic instruments. Fedorov, V. (Joint Publications Research Service, Arlington, VA (USA)). Mar 1982. 3p. NTIS, PC A07/MF A01.

In its USSR Rept.: Space, No. 15 (JPRS-80424) p 59-61 (SEE N82-24253 15-12) Transl. into ENGLISH from Aviats. Kosmonavt. (USSR), no. 11, Nov. 1981 p 22-23.

The term otpico-electronic customarily refers to instruments in which processing of information on the subject under observation entails conversion of radiant energy to electrical energy. Such instruments are often components of sighting and navigation systems and are intended for detection and recognition of visible terrestrial features and for measurement of their coordinates during the day under normal weather conditions and when haze is present. Whether or not features with different colors and contrast levels can be detected and recognized depends on the observation conditions, the resolving power and sensitivity of the eye, and the properties of the optico-electronic instrument that governs its basic parameters. Atmospheric conditions have a considerable influence on the transmission of electromagnetic waves. In a clear atmosphere or in haze, short infrared waves (0.76 to 1.5 microns) in the 0.95 to 1.05 and 1.2 to 1.7 micron regions are transmitted better than waves falling into the visible region of the spectrum (0.4-0.76 microns). As a consequence, the distance from which objects can be detected with the aid of optico-electronic instruments operating in the region of short infrared wavelengths should be somewhat greater than that from which they can be discerned with the naked eye.

21627 (NASA-CASE-NPO—15423-1) Ion mass spectrometer. Neugebauer, M.M. (JPL, California Inst. of Tech., Pasadena); Clay, D.R. (JPL, California Inst. of Tech., Pasadena); Golstein, B.E. (JPL, California Inst. of Tech., Pasadena); Goldstein, R. (JPL, California Inst. of Tech., Pasadena). (Jet Propulsion Lab., Pasadena, CA (USA)). Mar 1982. 16p. NTIS, PC A02/MF A01.

An ion mass spectrometer is described which detects and indicates the characteristics of ions received over a wide angle, and which indicates the mass to charge ratio, the energy, and the direction of each detected ion. The spectrometer includes a magnetic analyzer having a sector magnet that passes ions received over a wide angle, and an electrostatic analyzer positioned to receive ions passing through the magnetic analyzer. The electrostatic analyzer includes a two dimensional ion sensor at one wall of the analyzer chamber, that senses not only the lengthwise position of the detected ion to indicate its mass to charge ratio, but also detects the ion position along the width of the chamber to indicate the direction in which the ion was travelling.

21628 (ONERA-NT—1981-8) Laser techniques in chemical diagnostics. Attal, B. (Office National d'Etudes et de Recherches Aerospatiales (ONERA), 75 - Paris (France)). 1981. 58p. NTIS, PC A04/MF A01.

REFS.

Optical diagnostic techniques that are applicable to fluid dynamics, combustion research and atmospheric sounding are reviewed. Development of these methods is outlined, stressing the use of lasers. Three of these techniques are discussed in detail: (1) laser induced fluorescence (LIF), (2) spontaneous Raman scattering (SRS), and (3) coherent antistokes Raman scattering (CARS). The LIF method is found particulary well-suited for trace species analysis. Low scattering cross section is the major drawback of SRS, however, it is still preferred when the concentration of major constituents of a gas system is to be measured. The unique properties of CARS, i.e. good signal strength and absence of fluorescence interference, make this technique the best for nonintrusive flame diagnostics.

21629 **(REPT—482-DT-4) Study of image processing in a photon detection assembly. Final report.** Matticari, G.; Cumeni, D. (Officine Galileo S.p.A., Florence (Italy)). Jul 1981. 130p. NTIS, PC A07/MF A01.

ESA.

The design, software, and electronics of a photon detector are described. A lens whose focal plane is coincident with the photocathode external face discriminates the direction of incoming photons. The intersifier stage includes an S-20 type photocathode, curved channel microchannel plate capable of high gain, and a phosphorus screen whose spectral response matches that of the detector. Between the photocathode and the input face of the microchannel plate, a proximity focusing operation permits the photons from the photocathode to enter the microchannels with enough energy to evoke the secondary emission. The optical coupling phosphor CCD matrix array relay optics consist of a fiber optics bundle. A management subroutine decides the kind of operation to be executed during software test activities, i.e., program definition or application program realization.

21630 **(SAND—82-2918) ORVIS: optically recording velocity interferometer system. Theory of operation and data-reduction techniques.** Bloomquist, D.D.; Sheffield, S.A. (Sandia National Labs., Albuquerque, NM (USA)). Feb 1983. Contract AC04-76DP00789. 32p. NTIS, PC A03/MF A01. Order Number DE83008309.

An optically recording velocity interferometer system (ORVIS) has been developed to measure particle velocity histories in shock wave experiments on condensed matter. The interferometer fringe motion is recorded with a high speed electronic streak camera, rather than with photomultiplier tubes and oscilloscopes as in previous interferometry systems. With this approach, the particle velocity of a witness foil in a detonation wave experiment was measured with 300-ps time resolution. We believe that 20-ps time resolution can be achieved with this technique which would represent an improvement of two orders of magnitude over previous measurement techniques. The optical design is described along with techniques for operation. The data reduction system is described including a computer program for digitizing and analyzing the recorded images.

21631 **(SAND—82-2937C) IIR algorithms for adaptive line enhancement.** David, R.A.; Stearns, S.D.; Elliott, G.R.; Etter, D.M. (Sandia National Labs., Albuquerque, NM (USA); New Mexico Univ., Albuquerque (USA)). 1983. Contract AC04-76DP00789. 4p. (CONF-830407—1). NTIS, PC A02/MF A01. Order Number DE83005009.

From International conference on acoustics, speech, and signal processing; Boston, MA, USA (14 Apr 1983).

We introduce a simple IIR structure for the adaptive line enhancer. Two algorithms based on gradient-search techniques are presented for adapting the structure. Results from experiments which utilized real data as well as computer simulations are provided.

21632 **Simple reverse bending machine for low cycle fatigue at elevated temperatures.** Yavari, P.; Langdon, T.G. (Departments of Materials Science and Mechanical Engineering, University of Southern California, Los Angeles, California 90089-1453). *Review of Scientific Instruments;* **54**: No. 3, 353-356(Mar 1983). Contract AM03-76SF00113.

A simple reverse bending machine is described for tests in low cycle fatigue at elevated temperatures. The machine is easy to construct, simple to operate, and it is especially useful for detailed metallographic investigations in low cycle fatigue. The machine has been used for strain amplitudes up to +- 0.5% and frequencies of the order of 10^{-3}—10^{-1} Hz. Some typical experimental results are described for high-purity aluminum tested in air at 300 °C.

21633 **Penetrameter positioner for bore-side radiography of tubes.** Davis, E.V.; Foster, B.E. (to Dept. of Energy). US Patent 4,368,996. 18 Jan 1983. Filed date 27 Jan 1981. vp.

PAT-APPL-228838.

A positioner is provided for placing plaque or wire penetrameters, as used in radiographic inspection, in close proximity with the inner wall of tubing at any desired location along the tubing. The positioner head carrying the penetrameter is inflatable whereby it is positioned in the deflated condition, inflated to place the penetrameter against a weld to be inspected in the tubing wall, and then deflated during removal. If desired, the penetrameter holder may be used to center the radiographic source on the axis of the tube.

21634 **Sludge sampler.** Ward, R.C. (to Dept. of Energy). US Patent 4,367,657. 11 Jan 1983. Filed date 25 Jun 1981. vp.

PAT-APPL-277435.

The disclosure relates to a sludge sampler comprising an elongated generally cylindrical housing containing a baffle containing an aperture. Connected to the aperture is a flexible tubing having a valve for maintaining and releasing pressure in the lower end of the housing and exiting the upper end of the housing. The lower end of the housing contains a ball check valve maintained in closed position by pressure. When the lower end of the device contacts the sludge bed, the pressure valve is opened, enabling sludge to enter the lower end of the housing. After the sample is collected the valve is closed. An upsetting pin opens the valve to empty a sludge sample after the sample is removed from the fluid.

21635 **New technique for measuring excited-state lifetimes in ions using rapid Doppler switching.** Gaillard, M.L.; Pegg, D.J.; Bingham, C.R.; Carter, H.K.; Mlekodaj, R.L.; Cole, J.D. (University of Tennessee, Knoxville, Tennessee 37996). *Physical Review* [*Section*] *A: General Physics;* **26**: No. 4, 1975-1983(Oct 1982). Contract AS05-76ER04936.

A new and accurate method for measuring lifetimes of excited ionic states is described. The method employs selective laser excitation and rapid Doppler tuning to convert the spontaneous exponential decay of the excited state into a spatial variation of fluorescence intensity. The technique has been tested on the 6p ^{2}P/ sub 3/2/^{0} Ba II level and our final result of 6.35 +- 0.09 nsec is in excellent agreement with previous high-precision measurements. The method should make it possible to routinely achieve 1 percent accuracy measurements of ionic lifetimes longer than a lower limit of a few nanoseconds, set by transit-time broadening and ion-beam velocity spread.

21636 **Transmission gratings for the extreme ultraviolet.** Arakawa, E.T.; Caldwell, P.J.; Williams, M.W. (Oak Ridge National Lab., TN). *Optical Engineering;* **20**: No. 5, 753-755(Sep-Oct 1981). Contract W-7405-ENG-26.

A technique has been developed for producing transmission diffraction gratings suitable for use in the extreme ultraviolet. Thin self-supporting films of a transparent material are overlaid with several thousand opaque metallic strips per mm. Gratings with 2100, 2400, and 5675 1/mm have been produced and tested. Representative spectra over the wavelength range from 17.2 to 40.0 nm are given for a grating consisting of a 120 nm thick Al support layer overlaid with 2400, 34 nm thick, Ag strips/mm. The absolute transmittance is ca 13% at 30 nm, and the efficiency in the first order is ca 16%. The observed resolution of 0.2 nm is acceptable for many of the potential applications. These gratings have several advantages over the two presently available alternatives in the extreme ultraviolet (i.e., reflection gratings used at grazing incidence and free-standing metallic wire transmission gratings). Fabrication is relatively quick, simple, and cheap. The support layer can also serve as a filter and help conduct excessive heat away. Higher line densities and hence higher resolutions are possible, and when used at normal incidence the spectra are aberration free. Suitable materials, component thicknesses, and line densities can be chosen to produce a grating of optimum characteristics for a particular application.

21637 **ASTM standard practice for testing fixed-wavelength photometric detectors used in liquid chromatography.** Wolf, T. (Colgate-Palmolive Co., Piscataway, NJ); Fritz, G.T.; Palmer, L.R. *Journal of Chromatographic Science;* **19**: 387-391(Aug 1981).

A standard testing procedure has been devised for fixed-wavelength photometric detectors (FWPD) used in liquid chromatography. The need for this procedure, the objectives for developing it, and the means for accomplishing the objectives are outlined. Salient details of the procedure are discussed including the determination of nine characteristics of FWPDs. After an evaluation by ten laboratories, the revised procedure was balloted and revised again according to ASTM procedures (1). The final revised version is now available from ASTM as Standard Practice E 685 (2).

21638 **An ultrahigh-sensitivity facility for electrical resistivity experiments in a liquid helium environment.** Ockers, S.T.; Berger, A.S. (Argonne National Lab., IL). *Journal of Physics E: Scientific Instruments;* **13**: 273-275(1980).

A measurement facility is described which provides direct digital output of the electrical resistance of a metal sample, immersed in He II at 1.7 K, with an uncertainty of less than 8×10^{-10} Ω and a linearity of +/- 0.005%. When it is used to measure the concentration of thermally induced (quenched-in) vacancy-type crystal lattice defects in copper and aluminium the equivalent concentration sensitivity is about 10^{-8}. The system uses a microprocessor-based control and calculation program stored in a non-volatile memory for ease of operation when the equipment is switched on or off.

4404 Well Logging Instrumentation

REFER ALSO TO CITATION(S) 19790, 19906, 19907, 22880

21639 (SAND—82-2002C) **Proceedings of the second PFN uranium logging seminar.** (Sandia National Labs., Albuquerque, NM (USA)). Jan 1983. Contract AC04-76DP00789. 153p. (CONF-8105203—). NTIS, PC A08/MF A01. Order Number DE83007368.

From 2. prompt fussion neutron uranium logging seminar; Albuquerque, NM, USA (19 May 1981).

The Prompt Fission Neutron (PFN) uranium logging system developed by Sandia National Laboratories for the US Department of Energy is described in some detail in papers by the staff that was involved in the final phase of the development project, and by others associated with the project as users of the logging probe or builders of some of the probe hardware. Descriptions are provided of the probe's electronic circuits, the uphole instrumentation, the log interpretation technique, field experience, neutron detection hardware, neutron generator design, life-test results, and observations by Bendix Field Engineering Corporation personnel regarding the use of the probe and its results.

21640 (SAND—82-2002C, pp 8-20) **Principles of the PFN probe.** Humphreys, D.R. Jan 1983. NTIS, PC A08/MF A01.

From 2. prompt fussion neutron uranium logging seminar; Albuquerque, NM, USA (19 May 1981).

This paper outlines the physical principles of the Sandia Prompt Fission Neutron (PFN) uranium logging probe and briefly describes its main parts.

21641 (SAND—82-2002C, pp 38-55) **Description of PFN probe electronic circuits.** Weinlein, J.H. Jan 1983. NTIS, PC A08/MF A01.

From 2. prompt fussion neutron uranium logging seminar; Albuquerque, NM, USA (19 May 1981).

The PFN probe has three modules: (1) the dc-dc converter/reservoir control module; (2) the pulse generating assembly module; (3) the detector/TTA module. The configuration of these modules within the probe casing is shown. At present the modules are tied together with connectors. To minimize noise pickup, coaxial pins were employed for signal lines. Because these connectors proved to be extremely difficult to procure, a design eliminating connectors and hard-wiring the modules together has been completed.

21642 (SAND—82-2002C, pp 56-68) **Uphole instrumentation for PFN logging.** Stephenson, W.A. Jan 1983. NTIS, PC A08/MF A01.

From 2. prompt fussion neutron uranium logging seminar; Albuquerque, NM, USA (19 May 1981).

The instrumentation system described here has evolved over approximately a five year period; however, it is not the only way to gather and store the data for PFN logging. This description should enable the potential user to understand the objectives and choose a method most suitable for his capabilities and requirements. Sandia's method of PFN logging uses two logging tools. The PFN tool is used for locating and logging zones of interest. A second tool is used to obtain a borehole caliper and a compensated density log of these zones which is used for log interpetation. The Sandia logging truck uses a conventional winch system and type-4HO logging cable. The data are collected and stored on magnetic tape. Space limitations did not allow inclusion of a minicomputer and output devices in the logging truck; consequently, data analysis cannot be done on site. Data-analysis software has been written for a stand-alone PDP 11/34 minicomputer and could be used for a minicomputer in the logging truck if space were available. An analog display of epithermal energy neutrons is used in the logging truck to enable the operator to locate the zones of interest. The analog signal is not used for data analysis or for grade estimates.

21643 (SAND—82-2002C, pp 69-76) **Measurement instrumentation for 14-MeV neutrons.** Riggan, W.C. Jan 1983. NTIS, PC A08/MF A01.

From 2. prompt fussion neutron uranium logging seminar; Albuquerque, NM, USA (19 May 1981).

The neutron generator output must be known to accurately assay the uranium in a formation by PFN logging. Therefore, the 14-MeV neutron generator output must be calibrated at some interval depending upon the stability of the generator and the logging accuracy required. At Sandia National Laboratories, we perform neutron measurements that are traceable to first principles which assure us of consistent measurements over periods of years. One detector, designated the lead probe, serves as a secondary standard which may be used directly, or to calibrate other detectors that are more suitable for some measurements. This document describes these 14-MeV source neutron detection systems and their application to the PFN uranium logging operation. Both existing techniques and methods under development are described.

21644 (SAND—82-2002C, pp 77-83) **Alternate neutron output calibration techniques for users of a PFN probe.** Jensen, D.H. Jan 1983. NTIS, PC A08/MF A01.

From 2. prompt fussion neutron uranium logging seminar; Albuquerque, NM, USA (19 May 1981).

The detector systems and the details of the calibration technique used by Sandia in the calibration of the neutron output of the PFN probe have been described previously. This paper describes both the basic calibration concepts and Sandia's proposals for calibration approaches by industry PFN users. A brief description of the licensing requirements for the use of the PFN probe and calibration system is also contained.

21645 (SAND—82-2002C, pp 84-99) **PFN field logging.** Stephenson, W.A. Jan 1983. NTIS, PC A08/MF A01.

From 2. prompt fussion neutron uranium logging seminar; Albuquerque, NM, USA (19 May 1981).

Of primary interest here is the PFN tool. The tool is designed so that no disassembly or field maintenance is necessary for normal operation. It should be obvious, however, that any device with the large number of components contained by this tool will have occasional failures. A van was equipped to accompany the logging truck because the logging tools were too long and too numerous to be carried by the truck. Due to the experimental nature of the project, this same van was also equipped to provide a place for field service and neutron output calibration equipment for the PFN tool.

21646 (SAND—82-2002C, pp 100-118) **Discussion of the performance and calibration of two PFN probes.** Sterling, D.L. (Bendix Field Engineering Corp., Grand Junction, CO). Jan 1983. NTIS, PC A08/MF A01.

From 2. prompt fussion neutron uranium logging seminar; Albuquerque, NM, USA (19 May 1981).

The US Department of Energy at the Grand Junction Operation (GJO) has two of the Sandia-built prompt fission neutron (PFN) probes. In this paper I assume that the reader is familiar with the design and operation of the probe. I give a thumbnail sketch of the hardware and software used in our uranium logging truck and touch on some of the problems we have faced in using the probe. Then I go into the calibration procedures used at GJO and discuss some of the problems in the measurement itself. This paper serves as a starting point for those in industry involved in the calibration of a PFN probe.

21647 (SAND—82-2002C, pp 119-135) **Log interpretation.** Barnard, R.W. Jan 1983. NTIS, PC A08/MF A01.

From 2. prompt fussion neutron uranium logging seminar; Albuquerque, NM, USA (19 May 1981).

Prompt Fission Neutron (PFN) uranium logging data are interpreted using calculational models which relate observed data and independently-determined parameters to standard uranium grade values. The observed data are epithermal neutron detector response, which is proportional to uranium grade, and thermal neutron detector response. Both detector responses depend on some of the properties of the earth formation (such as the borehole diameter, the formation water content, and formation bulk density) and on the neutron generator output. The procedure by which grade estimates are made is to postulate model and to calibrate the model against standards, such as the US DOE Fission Neutron Model test pits at Grand Junction, CO, and other locations. The calibration gives a factor which relates the field data logs to the uranium grades reported for the test pits. Different calibration factors may be needed for water-filled boreholes and for air-filled boreholes, but the grade model is designed to accommodate different earth formations or borehole diameters.

21648 (SAND—82-2002C, pp 136-139) **Zetatron tube and transformer technology transfer.** Reichardt, J.W. (Kaman Sciences Corp., Colorado Springs, CO). Jan 1983. NTIS, PC A08/MF A01.

From 2. prompt fussion neutron uranium logging seminar; Albuquerque, NM, USA (19 May 1981).

The purpose of the Zetatron tube and transformer technology transfer was to develop a commercial supplier capable and willing to supply neutron tubes and tube/transformer assemblies to the commercial market. Sandia National Laboratories solicited competitive bids on this activity. Kaman Sciences was awarded the contract and work began during May 1978. The first phase of the contract was to build ten Zetatron tubes, five test transformers and three tube/transformer assemblies. Sandia furnished complete drawing sets, some equipment and technical assistance. Kaman was to procure all piece parts through commercial suppliers, design and fabricate tooling, and develop processes. Design changes were expected to occur during the first phase of the contract. The purpose of the first phase was, therefore, twofold: (1) to implement and prove out the tube and transformer design and (2) to establish Kaman's capability to fabricate tubes, transformers and tube/transformer assemblies. This phase of the contract was completed on September 30, 1979. The second phase of the contract consisted of fabricating ten Zetatron tubes, ten test transformers, and eight tube/transformer assemblies. The purpose of this phase of the work was to prove Kaman's capability to consistently build high quality hardware. This phase of the contract started during February 1980 and was completed during September 1980.

21649 (SAND—82-2002C, pp 140-150) **Life-test results on the Zetatron tube, transformer and the tube-transformer assembly.** Shope, L.A. Jan 1983. NTIS, PC A08/MF A01.

From 2. prompt fussion neutron uranium logging seminar; Albuquerque, NM, USA (19 May 1981).

In the development of the PFN probe it became evident that some considerable life testing of the neutron tube, high-voltage pulse transformer, and the tube-transformer assembly (TTA) were needed to (1) identify life limiting mechanisms, (2) estimate performance degradation, and (3) provide a data base for end-of-life predictions. Initial results had shown clearly that testing monitored by technicians would be much too costly. Consequently, a computer-controlled and monitored test was developed. This paper describes the test, summarizes the records, and discusses the results. Also presented are early results of actual probe life testing now underway.

45 EXPLOSIONS AND EXPLOSIVES

4501 Chemical

REFER ALSO TO CITATION(S) 19763, 21247, 21297

21650 **(LA—9612-MS) Oblique interactions of detonation waves with explosive/metal interfaces.** Walsh, J.M. (Los Alamos National Lab., NM (USA)). Dec 1982. Contract W-7405-ENG-36. 18p. NTIS, PC A02/MF A01. Order Number DE83007119.

The interaction of a detonation wave with an explosive/metal interface is considered. Theoretical models are discussed, and calculated results are given for PBX 9501 onto uranium, tantalum, copper, 304 stainless steel, aluminum, and nickel. For PBX 9501 onto aluminum and copper, regular shock reflection (in the PBX 9501) at small angles changes to regular rarefaction reflection (Prandtl-Meyer flow) at large angles, and the curve of metal-shock pressure vs incidence angle is smooth. For the other metals, there is a discontinuity in shock pressure where low-angle, regular reflection transists to Mach reflection, and a smaller discontinuity where the Mach reflection changes back to high-angle regular reflection.

21651 **(MHSMP—83-03) Corner-turning characteristics of TATB/HMX/Kel-F mixtures.** Stallings, T.L.; Osborn, A.G.; West, G.T. (Mason and Hanger-Silas Mason Co., Inc., Amarillo, TX (USA)). Jan 1983. Contract AC04-76DP00487. 14p. NTIS, PC A02/MF A01. Order Number DE83006931.

A factorial experiment was conducted to determine the effects of HMX content, HMX particle size and TATB particle size in TATB/HMX-Kel-F formulations containing 5% by weight Kel-F 800 binder on corner-turning performance at ambient and -54 C. TATB and HMX particle-size variations did not significantly affect differences in corner-turning performance between the two temperatures. With increasing HMX contents the effect of temperature on corner turning became less and at the maximum HMX content studied, 25%, the corner turning levels were almost equal at ambient and -54 C.

21652 **(MLM-MU—83-62-0001) Tester design concepts for Component Test Facility.** Allison, J.L. (Monsanto Research Corp., Miamisburg, OH (USA). Mound). 15 Feb 1983. Contract AC04-76DP00053. 10p. NTIS, PC A02/MF A01. Order Number DE83007033.

The general tester design concepts for the proposed Component Test Facility cover basic design requirements for the high-speed camera testing areas and the single-point tester area. The three large test cells in this facility will withstand blast effects from ten-pound TNT equivalent detonations. The basic test systems associated with these test cells will be automatic computer control systems capable of analyzing the test data they acquire. A major concern in this design of the test systems is safety for both personnel and equipment. Several factors have been considered and special systems will be built to provide safeguards against accidents. The Component Test Facility was submitted as a 1984 line item; completion is scheduled for the fourth quarter of 1986.

21653 **(UCID—19697) Response of porous beds to rapid gas pressurization.** Weston, A.M.; Lee, E.L. (Lawrence Livermore National Lab., CA (USA)). 14 Feb 1983. Contract W-7405-ENG-48. 28p. NTIS, PC A03/MF A01. Order Number DE83007309.

A two phase, one dimensional, Lagrange hydrodynamic program has been developed to compute the response of a porous bed to rapid gas pressurization. It has been used to investigate plug formation in porous beds, starting with different initial values for density (percent TMD), with different initial sized granulations (particle size), and with different values for material yield (flow) stress. The program is based upon a chain of finite element cells each of which represent the porous media with equations that assume the closure of a spherical pore. Gas flow is then treated with difference equations derived from the differential equations for adiabatic flow with friction in a circular duct. Since the cell definition includes discrete gas volume and gas flow area, the choice of calculational cell size is equivalent to the choice of a unique physical system, i.e., initial density and granulation. Calculational results are compared to data obtained on granulated rocket motor propellants in plastic pipe deflagration to detonation transition (DDT) experiments. These materials are very compliant. Experimental pressurization rates associated with detonation are shown to be of similar magnitude to the calculated pressurization rates that lead to the formation of a forward moving compaction plug. Calculational results are also compared with data from a DDT tube experiment performed on Winchester 231 reloading powder, a much less compliant material. A pressurization rate can be selected for which the calculated compaction front velocity agrees well with the experimentally observed luminous front velocity from the streak camera record. Also, the calculated displacement profiles are in reasonable agreement with experimental displacement profiles observed in x-ray photographs.

21654 **(UCID—19699) Summary of ignition and growth modeling of shock initiation and delayed detonation in full-density and porous propellants.** Tarver, C.M. (Lawrence Livermore National Lab., CA (USA)). 14 Feb 1983. Contract W-7405-ENG-48. 18p. NTIS, PC A02/MF A01. Order Number DE83007405.

The current status of the propellant modeling effort, a physically consistent model of ignition and growth of reaction in full density and porous propellants has been developed that yields good simulations of shock initiation and XDT phenomena in various geometries, but can not as yet satisfactorily explain the shock initiation process that occurs in the porous compaction process in DDT experiments. The limitations of a model extrapolated from shock initiation processes to low pressure and slow compression rate processes have been demonstrated, and a more complete description of the processes involved in DDT will have to be developed to accurately model the piston compaction experiment. Some of these planned additions to extensions of the current model are discussed in the Future Plans section.

21655 **(UCID—19726) I.R. emission measurements of shocked rocket propellants by time-resolved infrared radiometry.** Von Holle, W.G. (Lawrence Livermore National Lab., CA (USA)). 14 Feb 1983. Contract W-7405-ENG-48. 22p. NTIS, PC A02/MF A01. Order Number DE83007356.

This report is a summary of the results of the application of time-resolved radiometry to the study of SDT in VRP, VOY, FKM and ALTU-16. Some of the data have been previously reported. An attempt is made to integrate and correlate all the data in order to arrive at conclusions about the effect of the composition of these propellants on their response to shock stimulus. These propellants were chosen to represent extremes of sensitivity and composition. After a brief description of the gun experiments, the bare propellants results are discussed, followed by KCl overlay experiments. Finally, shredded VRO-2B gun-impact experiments which were done to elucidate the nature of the reactions occurring in porous systems, important for understanding DDT and XDT, are described. Results of infrared radiometry experiments have provided time-resolved temperature and fraction reacted data for a series of shocked propellants with different composition. Results on free surfaces demonstrated the heterogeneity of shock-induced reaction and indicated a wide range of responses. VOY and FKM were found to be highly reactive; VRP and ALTU-16 almost inert. KCl crystal confined experiments allowed the heterogeneity of the shock induced reaction to be confirmed, and the evolution of reaction under pressure was compared to 9404. Confinement smooths the differences between propellants, but VOY remains the standout from the rest.The ordering of shock induced reactivity follows the ordering of calculated HEX and flame temperatures. The KCl experiments show a large early pressure-dependent change in reaction rate which is inconsistent with manganin gauge pressure measurements. The most likely explanation seems to be a rapid binder decomposition reaction, which is highly pressure dependent and which would lead to large pressure increases at longer run distances than available in these experiments.

21656 **(UCRL—88532) Computer simulation of concrete penetration by shaped-charge jets.** Murphy, M.J.; Henderson, J.M. (Lawrence Livermore National Lab., CA (USA); California Univ., Davis (USA). Dept. of Mechanical Engineering). 7 Jan 1983. Contract W-7405-ENG-48. 12p. (CONF-830417—1). NTIS, PC A02/MF A01. Order Number DE83007359.

From 7. international symposium on ballistics; Hague, Netherlands (19 Apr 1983).

A unified analytical approach to the solution of the shaped-charge penetration in concrete problem has been developed and is presented. The analytical model is correlated to three types of experiments that study the shaped-charge jet-formation process and resulting penetration phenomena. Hydrodynamic finite-element analysis of the explosive detonation, liner collapse, and jet-formation process is compared to a flash x-ray experiment. Analytical predictions of the penetration-time history are compared to experiments where the penetration-time history is monitored. These experiments provide for a determination of the minimum jet velocity for penetration as a function of standoff. Finally, computer predictions of total penetration and hole profile are compared to experiments. These correlations provide for a determination of the jet energy/target hole volume constant for concrete. The method developed is shown to be valid for a broad range of shaped-charge designs in concrete targets. Preliminary investigations with other target materials show the method can be extended to predict penetration for generalized shaped-charge designs into any target as long as some basic target-material properties are known.

4502 Nuclear

REFER ALSO TO CITATION(S) 19888, 21354, 22896

21657 **(AD—244784/5) Shock, vibration and associated environments. Part III.** (Office of the Secretary of Defense (Research and Engineering), Washington, DC (USA)). Sep 1960. 322p. (BULL—28-PT-3). NTIS, PC A14/MF A01.

No abstract available.

21658 **(AD-A—115482/2) Strategic targeting of light water reactors. Master's thesis.** Domaszek, G.R. (Air Force Inst. of Tech., Wright-Patterson AFB, OH (USA). School of Engineering). Mar 1982. 96p. (AFIT/GNE/PH—82M-7). NTIS, PC A05/MF A01.

The value of light water reactors as strategic nuclear targets for enhancing fallout is evaluated in this report. The evaluation is made by determining the ratio of the probability weighted fallout coverage from one or more weapons which involve the reactor core, to the fallout coverage from a single weapon weighted by the number of weapons targeted. This ratio is the factor by which targeting reactors will enhance the area of fallout coverage. Targeting reactors with a single weapon will always enhance fallout coverage. However, the probabilistic amount of coverage increase is dependent on weapon CEP. Area coverage of a particular dose during the first week is increased by less than 5 percent for CEPs greater than 350, 400, and 500 meters corresponding to yields of 100, 500, and 1000 kilotons, respectively. During the first year, the area is increased by less than 5 percent for CEPs greater than 900, 1100, and 1400 meters corresponding to yields of 100, 500, and 1000 kilotons, respectively. Finally, multiple weapon targeting of nuclear reactors in counter-productive in that is decreases the factor by which targeting reactors increases fallout area coverage.

21659 **(AD-A—115986/2) Standing waves and notches in a parallel-plate type of EMP simulator and their reduction. Final report.** Wu, T.T.; King, R.W.P.; Blejer, D.J.; Owens, M. (Mission Research Corp., Albuquerque, NM (USA)). Mar 1981. 43p. NTIS, PC A03/MF A01.

The high standing-wave ratio (SWR) in a model simulator in the mid-frequency range defined by kh = 2 pi h/delta approx. = 2 pi (where h is the height of the parallel-plate region) is investigated experimentally. It is shown that the isolated deep minimum or notch is due to the mutual cancellation of the imaginary parts of the TM01 and TEM modes. The effects on the SWR and the deep minimum of changes in the magnitude and location of the termination resistance are investigated. Also studied are the introduction of a bifurcating plate, resistive modal filters, and series aprons. It is shown that with the proper adjustment of the last named, the notch can be eliminated and the SWR reduced to near two at discrete frequencies that span the entire mid-frequency range. Since the low-frequency ranges already have low SWRs, the simulator has been made effective over the entire frequency band in the sense that the SWR is low.

21660 **(AD-A—117958/9) Assessment of combined effects of blast and fire on personnel survivability. Final report 3 Apr 7-31 Jan 81.** Longinow, A.; Waterman, T.E.; Takata, A.N. (IIT Research Inst., Chicago, IL (USA)). Jun 1982. 178p. NTIS, PC A09/MF A01.

The objective of the study described was (1) to perform a preliminary analysis of hazards to sheltered personnel in a blast-fire environment produced by the detonation of a 1 MT nuclear weapon near the ground surface, and (2) to lay the basic ground work for developing a consistent, formal methodology for estimating the probability of people survival in a blast-fire environment.

21661 **(AD-A—118240/1) Soviet post-strike civil defense rescue, damage-limiting, repair and restoration operations. Final report 13 aug 81-12 aug 82.** Goure, L. (Science Applications, Inc., McLean, VA (USA)). Aug 1982. 193p. NTIS, PC A09/MF A01.

This report describes and analyzes, on the basis of open Soviet source material, Soviet civil defense concepts, organization, priorities, operational plans and capabilities pertaining to post-strike rescue, damage-limiting, emergency repair and restoration operations in centers of nuclear destruction. Soviet sources indicate that a great deal of importance is attributed to post-strike operations and that the overwhelming majority of civilian and military civil defense forces of over some 20 million are assigned to this mission.

21662 **(AD-A—118342/5) Nuclear weapons effects mitigation techniques.** Uyesugi, D.F. (Army Nuclear and Chemical Agency, Springfield, VA (USA)). Jun 1982. 47p. NTIS, PC A03/MF A01.

In order to fight and win on the AirLand battlefield, the US must be able to employ nuclear weapons decisively, and continue to fight effectively after enemy employment. Survival of personnel and equipment and recovery from injury or damage are essential to continued operations in the nuclear environment. Accordingly, the specific vulnerabilities of personnel and equipment must be understood and measures taken to lessen or minimize the impact of potential nuclear weapons effects. In recognition of this need, USANCA intends to publish several Nuclear Notes addressing a wide range of weapons effects mitigation techniques. Basic mitigation techniques for nuclear weapons blast, thermal, ionizing radiation, and electromagnetic pulse (EMP) effects will be summarized, and the payoffs associated with employment of each or a combination of techniques will be discussed.

21663 **(AD-A—118396/1) Physical security modeling for the shipboard nuclear weapons security program.** Jacques, E.G.; Bartusek, D.L.; Monroe, R.W.; Schwartz, M.S. (Naval Surface Weapons Center, Silver Spring, MD (USA)). 1 Apr 1982. 74p. NTIS, PC A04/MF A01.

A modeling methodology in support of the Shipboard Nuclear Weapons Security program was needed in order to allow a trade-off of various candidate security systems. This document details the factors that lead to the modeling approach currently being used. In addition a brief description of the models along with examples is presented. The models were chosen for their ability to analyze the spectrum of potential threats pertaining to the operational conditions of a variety of ship classes.

21664 **(AD-A—118456/3) Mass fire model concept. Final report 8 Sep 80-31 May 81.** Sanderlin, J.C.; Ball, J.A.; Johanson, G.A. (Mission Research Corp., Santa Barbara, CA (USA)). 31 May 1981. 330p. NTIS, PC A15/MF A01.

Review of the literature pertaining to mass fire onset and development indicates there exist no models that describe the onset and development of mass fires. The state-of-the-art is such that a low confidence level, parametric model can be developed. The theoretical basis, and a preliminary implementation, are described for a low confidence level, parametric model of mass fire onset and development in an urban environment.

21665 **(AD-A—120061/7) Analytic research on strategic, tactical and doctrinal military concepts: the concept of stability. Final report 1 May-19 Dec 79.** Hammerman, G. (Dupuy (T.N.) Associates, Inc., Dunn Loring, VA (USA)). 3 Oct 1980. 136p. NTIS, PC A07/MF A01.

This report distinguishes between international political stability and strategic nuclear stability, providing a concise history of each concept. It then defines the following subcategories of strategic nuclear stability: deterrence stability, crisis stability, arms race stability, and escalation stability. The development of what is termed orthodox nuclear strategic doctrine, which holds that stability depends upon both nuclear superpowers' having invulnerable retaliatory forces and vulnerable societies, is traced from its beginnings about 1960 to the present. The role of stability, in the 1960s and 1970s, as the key link between arms control policy and weapons acquisition policy is identified and discussed. Alternative approaches to stability, including Soviet views, are summarized. An extensive, fully annotated bibliography is included.

21666 **(DOE/EV/03161—2) Mortality follow-up of Shirabe 1945 Nagasaki questionnaire sample, 1945-1966.** Tachikawa, K. (Radiation Effects Research Foundation, Hiroshima (Japan); National Inst. of Health, Hiroshima (Japan)). 1 Jul 1971. Contract AC01-76EV03161. 22p. (In English and Japanese). NTIS, PC A02/MF A01. Order Number DE83007697.

The November 1945 questionnaire survey by Dr. Raisuke Shirabe, professor of surgery at Nagasaki University Medical School, provides a means of investigating the mortality of Nagasaki A-bomb survivors during the period 1945-1950, which is excluded from the JNIH-ABCC Life Span Study. The roster of about 5500 alive on the survey date included, on investigation, 4208 who had their honeski in Nagasaki on that date. Their deaths were ascertained by checking against the koseki. Since the sample is small, no significant relationship to A-bomb exposure distance is noted, though a trend is presented toward more deaths observed than expected in the proximally exposed.

21667 **(DOE/EV/03161—T1) Mortality among atomic bomb survivors, October 1945-September 1964. ABCC Technical Report 6-69.** Tachikawa, K.; Kato, H. (Radiation Effects Research Foundation, Hiroshima (Japan); National Inst. of Health, Hiroshima (Japan)). 24 Apr 1969. Contract AC01-76EV03161. 30p. (In English and Japanese). NTIS, PC A03/MF A01. Order Number DE83007691.

A casualty survey was conducted on 10 August 1946 in Hiroshima City and a total of 103,991 persons were enumerated on survey sheets within the city limits of Hiroshima. The mortality of these persons was investigated for the 19 years from October 1945 to September 1964 by the following three periods October 1945-September 1946; October 1946-September 1950; and October 1950-September 1964. There was an excess of mortality in the proximally exposed during the period October 1945-September 1946, as might be expected. The excess of mortality in the proximally exposed was still observed for the succeeding 4 years, October 1946-September 1950. There was an excess of mortality from leukemia and anemia in the proximaally exposed for this period. For the period October 1950-September 1964, there was an excess of mortality in the proximally exposed. The excess of mortality was observed for the first 4-year period (1950-1954) and was not observed for the next 4 years and again became significant in the last 4 years 1958-1962. In general, the findings observed for this period are similar to the findings previously observed on the Life Span Study sample.

21668 **(LA-UR—83-198) Source terms for the initial radiations.** Whalen, P.P. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 42p. (CONF-830209—2). NTIS, PC A03/MF A01. Order Number DE83007574.

From US/Japan joint workshop on the reassessment of A-bomb radiation dosimetry in Hiroshima and Nagasaki; Nagasaki, Japan (16 Feb 1983).

Calculations are provided of the prompt neutron and gamma-ray outputs of the Hiroshima and Nagasaki bombs and calibration data provided to support these calculations. Estimates with uncertainties of the yields of the Hiroshima and Nagasaki explosions are also presented. Calibration data for the Nagasaki bomb output calculation consists of the calculated outputs of several other test nuclear devices of the Nagasaki type for which dose measurements were obtained in test explosions. Calibration data for the Hiroshima bomb output calculation consists of spectral measurements of the neutron and gamma-ray outputs of a replica of the Hiroshima bomb operated as a critical assembly. The output spectra were calculated with classified special purpose computer codes which follow the evolution of the explosions. (ACR)

21669 (UCID—19419) Blast attenuation in a shot tunnel using water jets. Glenn, L.A.; Young, D.A. (Lawrence Livermore National Lab., CA (USA)). 2 Jul 1982. Contract W-7405-ENG-48. 45p. NTIS, PC A03/MF A01. Order Number DE82018508.

A quasi-one-dimensional method was devised for calculating transient, compressible, viscous flow through a complex array of tubes or jets with which mass, momentum and energy are exchanged. The method was applied to study the impulsive crossflow of a blast-wave-induced plasma through an annular array of water jets, positioned at a stand-off distance from the walls of a shot tunnel. The peak pressure and temperature near the wall can be reduced, in this way, by an order of magnitude or more.

21670 (UCRL—15508) Fire and the related effects of nuclear explosions. 1982 Asilomar Conference. Martin, S.B.; Alger, R.S. (eds.). (SRI International, Menlo Park, CA (USA)). Nov 1982. Contract W-7405-ENG-48. 133p. (CONF-8204106—Summ.). NTIS, PC A07/MF A01. Order Number DE83006568.

From 5. Federal Emergency Management Agency conference on fire and the related effects of nuclear explosions; Asilomar, CA, USA (25 Apr 1982).

This report summarizes the proceedings of a Federal Emergency Management Agency-sponsored Conference on fire and the related effects of nuclear explosions (with passing attention to earthquakes and other nonnuclear mishaps). This conference, the fifth of an annual series (formally called Blast/Fire Interaction Conferences), was held during the week of April 25, 1982, again at Asilomar, California.

21671 Air-over-ground calculations of the neutron, prompt, and secondary gamma free-in-air tissue kerma from the Hiroshima and Nagaski devices. Pace, J.V. III; Bartine, D.E.; Knight, J.R. (Oak Ridge National Laboratory, Oak Ridge, TN 37830). *Transactions of the American Nuclear Society;* 41: 471-472(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

21672 Source spectra calculations. Whalen, P.P.; Kammerdiener, J.; Streetman, R. (Los Alamos National Laboratory, P.O. Box 1663, Los Alamos, NM 87545). *Transactions of the American Nuclear Society;* **41**: 470-471(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

4503 Explosion Detection

REFER ALSO TO CITATION(S) 21794

21673 (AD-A—116048/0) A statistical discrimination experiment for eurasian events using a twenty-seven-station network. Technical report. Rivers, D.W.; von Seggern, D.H.; Elkins, B.L.; Sproules, H.S. (Teledyne Geotech, Alexandria, VA (USA). Seismic Data Lab.). 8 Jul 1980. 191p. NTIS, PC A09/MF A01.

An experiment was performed to test the effectiveness of a multivariate method of analysis for distinguishing earthquakes from explosions. The data base for the experiment consisted of digital recordings made at twenty-seven stations, including four large arrays, of one hundred thirty-three Eurasian events. Spectral magnitudes were measured in three frequency bands of the six phases P, Lg, long-period P, long-period S, LR, and LQ. Complexities of the P-waves were measured in three time windows, and corner frequencies and low-frequency spectral levels were computed for the P-wave spectra. When signals could not be detected, spectral magnitudes were measured of noise samples, and these were taken to be detection thresholds. Signal magnitudes and detection thresholds from all the stations were used to find maximum-likelihood estimates of the spectral magnitudes for each event. On account of gaps in the data, many different combinations of different numbers of variables were used in the classification of the one hundred thirty-three events. The variables which were applicable to the most events were short-period P-wave spectral ratios. The most effective discriminants were spectral ratios of Love waves to P waves.

50 ENVIRONMENTAL SCIENCES, ATMOSPHERIC

21674 Aerosols in science medicine and technology. Stoeber, W.; Hochrainer, D. Bad Soden, Germany; Gesellschaft fuer Aerosolforschung e.V. (1981). 319p. (CONF-8109188—). .

From Conference on aerosols in science and technology - aerosols in and from in and from industrial processes; Duisburg, F.R. Germany (23 Sep 1981).

This volume contains all papers presented at the 9th conference of the Association for Aerosol Research held in Duisburg, Germany F.R. in September 1981. This conference was attended by 160 participants and there were 39 oral and 16 poster presentations. Several papers are abstracted separately for the data base.

5001 Basic Studies

REFER ALSO TO CITATION(S) 21698, 21753, 21785, 21786, 21787, 21788, 21792

21675 (CNEN-RT/PROT—(81)9) Annual meteorological data at Trisaia, 1976. Fraschetti, G.; Mastrosimone, M.; Ricciardulli, L. (Comitato Nazionale per l'Energia Nucleare, Trisaia (Italy). Dipartimento Ciclo del Combustibile). Apr 1981. 62p. (In Italian). Dep. NTIS (US Sales Only), MF A01.

In this report are given climatological data measured at CRN Trisaia during the year 1976. Data are shown as tables or plots and represent the output of a program written for the circumstance.

21676 (CNEN-RT/PROT—(81)10) Annual meteorological data for CRN Della Trisaia, 1977. Fraschetti, G.; Mastrosimone, M.; Ricciardulli, L. (Comitato Nazionale per l'Energia Nucleare, Trisaia (Italy). Dipartimento Ciclo del Combustibile). Apr 1981. 62p. (In Italian). Dep. NTIS, PC A.

In this report are given climatological data measured at CRN Trisaia during the year 1977. Data are shown as tables or plots and represent the output of a program written for the circumstance.

21677 (CNEN-RT/PROT—(81)11) Annual meteorological data at CRN Trisaia, 1978. Fraschetti, G.; Mastrosimone, M.; Ricciardulli, L. (Comitato Nazionale per l'Energia Nucleare, Trisaia (Italy). Dipartimento Ciclo del Combustibile). Apr 1981. 62p. (In Italian). Dep. NTIS, PC A. Order Number DE82903025.

In this report are given climatological data measured at CRN Trisaia during the year 1978. Data are shown as tables or plots and represent the output of a program written for the circumstance.

21678 (CNEN-RT/PROT—(81)12) **Annual meteorological data for CRN Della Trisaia, 1979.** Fraschetti, G.; Mastrosimone, M.; Ricciardulli, L. (Comitato Nazionale per l'Energia Nucleare, Trisaia (Italy). Dipartimento Ciclo del Combustibile). Apr 1981. 62p. (In Italian). Dep. NTIS, PC A. Order Number DE82903026.

In this report are given climatological data measured at CRN Trisaia during the year 1979. Data are shown as tables or plots and represent the output of a program written for the circumstance.

21679 (CONF-820810—16) **Mathematical modeling of cooling-tower plumes.** Carhart, R.; Policastro, A. (Illinois Univ., Chicago (USA). Dept. of Physics; Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 4p. NTIS, PC A02/MF A01. Order Number DE83008681.

From 10. international mathematics and computers simulation congress on systems simulation and scientific computation; Montreal, Canada (9 Aug 1982).

The vast majority of mathematical models used to predict plume rise from natural-draft (NDCT) and mechanical-draft (MDCT) cooling towers employ the integral approach. The following significant areas of controversy exist in the theoretical development of such models: assumptions needed to assure the proper balance between buoyancy and momentum transfer mechanisms; treatment of tower downwash; treatment of thermodynamics; treatment of atmospheric diffusion; and proper method for merging of plumes. The most successful models employ assumptions which appear physically reasonable with calibration of unknown coefficients with field and/or laboratory data. Such models are capable of predicting visible plume rise within a factor of 2 and visible plume length within a factor of 2.5 for 50 to 75% of most new field cases. Such accuracy is sufficient for most design and environmental impact evaluations. Only the ANL and KUMULUS Models of this better-performing group are sufficiently general, however, to handle any configuration of NDCTs and MDCTs.

21680 (CONF-820970—, pp III.3-III.139) **Simulating CO_2-induced climatic change with mathematical climate models: capabilities, limitations and prospects.** Schlesinger, M.E. (Oregon State Univ., Corvallis). Feb 1983. NTIS, PC A23/MF A01.

From Carbon dioxide research conference: carbon dioxide, science and consensus; Berkeley Springs, WV, USA (19 Sep 1982).

Possible climatic changes induced by increased CO_2 levels are considered with a focus on the use of mathematical models of the earth's climate system. The characteristics of three different types of mathematical climate model are described with an emphasis on the general circulation model (GCM). Two types of simulation of the CO_2-induced climatic changes are described and attention is focused on the equilibrium simulations of eight GCMs for both doubled and quadrupled CO_2 concentrations. The geographical distributions of the CO_2-induced changes in the precipitation rate and soil moisture that have been simulated by the GCMs are compared, as are the corresponding zonal- and global-mean quantities.

21681 (LBL—13500-Exc., pp 4.5-4.7) **Aqueous reactions of nitrite with bisulfite ions in sulfate aerosol formation.** Oblath, S.B.; Chang, S.G.; Markowitz, S.S.; Novakov, T. Sep 1982. NTIS, PC A02/MF A01. Contract AC03-76SF00098.

In Atmospheric aerosol research. Excerpt from the Energy and Environment Division annual report, FY 1981, Chapter 4.

Possible reactions of hydroxylamine disulfonate and manosulfanates with nitrite ions were studied in the broader context of atmospheric chemistry role of nitrogen oxides in the formation of sulfate aerosols. (PSB)

21682 (N—82-18238) **Investigation on atmospheric h and d through the measurement of their lyman-alpha emissions.** Bertaux, J.L. (Centre National de la Recherche Scientifique, 75 - Paris (France)). Nov 1981. 3p. NTIS, PC A08/MF A01.

In NASA Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions 3 p (SEE N82-18234 09-12).

Study of sources of Lyman-alpha emission in the atmosphere, in the interplanetary medium, and perhaps in the galactic medium is planned. Sources of Lyman-alpha emission are described and a schematic of the instrument presented.

21683 (NP—3901017) **Contribution to the measurement of water wave induced infra-sound waves in Hamburg and their relation with microseismic waves and with the atmospheric propagation conditions.** Linde, B. (Hamburg Univ. (Germany, F.R.). Fachbereich Geowissenschaften). 4 Jun 1978. 169p. (In German). NTIS (US Sales Only), PC A08/MF A01. Order Number DE83901017.

In this study water wave induced infra-sound waves have been measured, and the results of these measurements are related with the excitation of infra-sound waves and the atmospheric propagation conditions. In addition the results are compared with microseismic waves. Investigations of this kind are performed to obtain a better insight in the layer structure of the atmosphere as well as in the production and propagation mechanisms of infrasound. The propagation of infra sound has been studied by the ray tracing method, taking into account the temperature and velocity distribution in the atmosphere. A strong directional dependence of the propagation is obtained in a model which includes the wind velocity distribution.

21684 (PNL-SA—10634) **Observations of drainage winds on a simple slope.** Doran, J.C.; Horst, T.W. (Pacific Northwest Lab., Richland, WA (USA)). Nov 1982. Contract AC06-76RL01830. 4p. (CONF-830307—12). NTIS, PC A02/MF A01. Order Number DE83007851.

From 6. American Meteorological Society symposium on turbulence and diffusion; Boston, MA, USA (22 Mar 1983).

Katabatic winds observed over a simple slope showed progressive deepening and strengthening with increased downslope distance. The maximum in the downslope wind component increases, and the height of the maximum rises as the flow develops. A measure of the flow depths obtained from the temperature profiles at the Rattlesnake Mountain site near Richland, Washington and the Cobb Mountain site in northern California shows that these depths are insensitive to the details of the ambient conditions, provided the drainage flows are well established. Depths of the katabatically driven winds appeared to be more sensitive to ambient wind directions.

21685 (UCRL—86266) **Explicit particle-dynamics model for granular materials.** Walton, O.R. (Lawrence Livermore National Lab., CA (USA)). May 1982. Contract W-7405-ENG-48. 9p. (CONF-8205151—1). NTIS, PC A02/MF A01. Order Number DE83006411.

From 4. international conference on numerical methods in geomechanics; Edmonton, Canada (31 May 1982).

Discrete-particle simulation of granular-material motion is developing into a viable method for studying how various interparticulate forces affect the bulk behavior of granular solids. A two-dimensional, polygonal-particle computer model, developed from the ideas of Cundall (1976), and incorporating other techniques from molecular dynamics, is being used in a study of the flow behavior of rubblized oil shale. Direct comparison with physical tests involving multiblock systems have verified the model's ability to predict the motion of real materials. Computer generated movies and high-speed motion pictures of physical tests involving gravity flow of 2-dimensional polygonal particles show formation of temporary arches followed by dynamic rupture and reformation of new arches. Direct shear tests on oil-shale rubble involving very large displacements indicate significant circulatory motion in the rubble. Computer simulation of the direct shear tests show similar behavior.

21686 **Experimental studies of ion clustering: relationship to aerosol formation processes and some atmospheric implications.** Castleman, A.W. Jr. *Journal of Aerosol Science;* 13: No. 1, 73-85(1982). Contract AC02-78EV04776.

Studies of the clustering of molecules about ions are of both fundamental and practical interest. The results find immediate application in assessing the validity of classical expressions for nucleation phenomenon and provide a basis for further developments of nucleation theory. It is well known that the atmosphere contains substantial ion populations and their potential role in aerosol formation provides a strong coupling between the fields of atmospheric electricity and other areas of the atmospheric sciences. As a result of recent advances in high pressure mass spectrometry, the detailed processes involved in the continuous transition of a system from the gaseous to the condensed (aerosol) state can be investigated at the molecular level. Many of the recent findings in ion clustering are reported in literature devoted to fundamental chemistry and physics and are not in a form of immediate value to the researcher in the field of aerosol science. The purpose of this paper is to review recent progress in understanding ion clustering as it relates to the general mechanisms of gas-to-particle conversion. Laboratory data on the bonding of various negative and positive ion complexes are used to assess the validity of the classical model to ion induced nucleation. Further consideration is given to the role of ion cluster-ion cluster interaction in aerosol formation.

21687 Combination of a screen-diffusion-battery with a single-stage impactor for size selective aerosol sampling. Niessner, R.; Klockow, D.; Fissan, H.; Kapitza, F. pp vp of Aerosols in science, medicine and technology. Stoeber, W.; Hochrainer, D. (eds.). Bad Soden, Germany; Gesellschaft fuer Aerosolforschung e.V. (1981).

From Conference on aerosols in science and technology - aerosols in and from in and from industrial processes; Duisburg, F.R. Germany (23 Sep 1981).

In the present paper a sampling method for size related chemical analysis is described which collects particles above 0.7 μm by impaction and separates submicron particles into two fractions by diffusion. The method has been used to investigate the content in sulfate, nitrate and chloride of the three modes of atmospheric aerosol.

5002 Chemicals Monitoring And Transport

REFER ALSO TO CITATION(S) 19434, 19576, 19578, 19582, 19583, 19584, 19585, 19586, 19587, 19588, 19598, 19606, 19643, 19720, 19729, 19748, 19881, 19958, 21193, 21468, 21470, 21679, 21813, 21824, 21830, 21891, 21916, 21990, 21991, 22003, 22006, 22019

21688 (AD-A—115443/4) Remote sensing of turbine engine gases. Final report 1 Oct 80-30 Sep 81. Killinger, D.K.; Menyuk, N.; Mooradian, A. (Massachusetts Inst. of Tech., Lexington (USA). Lincoln Lab.). 30 Sep 1981. 81p. NTIS, PC A05/MF A01.

This is the FY 81 final report on the program entitled 'Remote Sensing of Turbine Engine Gases'. The specific tasks which were conducted during FY 81 consisted of the following: (1) the feasibility demonstration of a dual-laser differential-absorption LIDAR(DIAL) system for the remote sensing of CO, NO, and C2H4, (2) the development of a data acquisition and processing system for the dual-laser DIAL system, (3) the laser remote sensing of CO and C2H4 in the exhaust of a stationary jet aircraft, and (4) the laser remote sensing of hydrazine, monomethylhydrazine (MMH), and unsymmetrical dimethylhydrazine (UDMH).

21689 (BNL—32339) Data-acquisition system for environmental monitoring aboard a twin-engined aircraft. Tichler, J.; Bernstein, H.; Brown, R.M.; Daum, P. (Brookhaven National Lab., Upton, NY (USA)). 1983. Contract AC02-76CH00016. 5p. (CONF-830412—1). NTIS, PC A02/MF A01. Order Number DE83005793.

From 5. symposium on meteorological observations and instrumentation; Toronto, Canada (11 Apr 1983).

A number of experimental platforms have been used in support of the Multistate Atmospheric Power Production Study (MAP3S) and the Coastal Meteorology programs at Brookhaven National Laboratory. These platforms include a twin-engine Britten Norman Islander aircraft, a motorized van, a variety of boats and temporary enclosures set up in the field. Each platform carried a data logger consisting of a multiplexer, an analog to digital (A/D) converter and a four track endless loop magnetic tape for data storage. In recent years it has become increasingly evident that the data loggers in use were no longer adequate. Since the aircraft provided the most constraints on the data acquisition system as well as being the most important research platform, a data system was designed for that platform with the secondary goal that the system would serve as a prototype for systems to be used on other platforms.

21690 (CONF-810808—12) Acidic deposition: review of current knowledge. Knudson, D.A. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 12p. NTIS, PC A02/MF A01. Order Number DE83007403.

From Energy in the man-built environment: the next decade specialty conference; Vail, CO, USA (3 Aug 1981).

Events in Europe which led to the introduction of the concern for acidic deposition in eastern North America are reviewed. Some of the early conclusions regarding the existence of a trend and the extent of the phenomenon are reexamined. These reexaminations indicate that the definition of a precipitation acidity trend is questionable. Also, it was verified that any explanation of the variability of precipitation acidity must consider such factors as drought and farming and forest management activities. The chemical constituents contributing most to precipitation acidity are reviewed as an indication of primary sources. Sulfate is the primary contributor in the Northeast (60 to 70%). The contribution due to nitrates in this region increased from about 22% in the mid-1950s to about 30% in 1973. However, in other regions deposition acidity may be attributable to a much different combination of chemical species, and may even be dominated by an acidic constituent other than sulfate or nitrate. Several individual processes involved in the transport and transformation of precursor pollutants from source to receptor were briefly reviewed. These processes included mechanisms for the transformation of SO_2 and NO/sub x/ emissions into sulfates and nitrates, specific meteorological conditions conducive to long-range transport, major source identification, and the incorporation of this information into mathematical models to predict acidic deposition amounts and patterns. Although the information presented does not explore ecery facet of each process, it does address important governing features and allows for an appreciation of the complexity of quantifying the complete process through use of mathematical models.

21691 (CONF-820627—12) Model for fabric-filter cleaning: single-element and multiple-compartment effects. Farber, P.; Theodore, L.; Reynolds, J. (Argonne National Lab., IL (USA); Manhattan Coll., New York (USA). Dept. of Chemical Engineering). Jun 1982. Contract W-31-109-ENG-38. 22p. NTIS, PC A02/MF A01. Order Number DE83007632.

From 75. annual meeting on the Air Pollution Control Association; New Orleans, LA, USA (20 Jun 1982).

A model for fractional removal in a fabric filter was applied to filtration systems. A method for allowing for the effect of imperfect cleaning of an element or compartment was developed; it was shown that this must be taken into account when modeling a system. Relations for superficial velocity through a dust-cake layer, as well as the buildup of this layer during filtration when cleaning is imperfect, were shown. Finally, the tools necessary for modeling a multicompartment system are described, and the reasons for changes in penetration when a compartment is taken out of service for cleaning are given. Increases in outlet grain loading can be explained as being due to the removal of the compartment with the highest efficiency, the subsequent increase in gas flow through the other compartments, and the return to filtration by a cleaned compartment with relatively high penetration.

21692 (CONF-820970—) Carbon dioxide research conference: carbon dioxide, science and consensus. (Oak Ridge Associated Universities, Inc., Washington, DC (USA). Inst. for Energy Analysis). Feb 1983. Contract AC05-76OR00033. 539p. NTIS, PC A23/MF A01. Order Number DE83007182.

From Carbon dioxide research conference: carbon dioxide, science and consensus; Berkeley Springs, WV, USA (19 Sep 1982).

The DOE program focuses on three areas each of which requires more research before the many CO_2-related questions can be answered. These areas include the global carbon cycle, climate effects, and vegetation effects. Additional information is needed to understand the sources and sinks of CO_2. Research efforts include an attempt to estimate regional and global changes in temperature and precipitation. Increased atmospheric CO_2 may be a potential benefit to vegetation and crops because it is an essential element required for plant growth. Eight separate papers are included. (PSB)

21693 (CONF-820970—, pp II.3-II.62) **Global carbon cycle: what we know and could know from atmospheric, biospheric, and oceanic observations.** Keeling, C.D. (Scripps Institution of Oceanography, La Jolla, CA). Feb 1983. NTIS, PC A23/MF A01.

From Carbon dioxide research conference: carbon dioxide, science and consensus; Berkeley Springs, WV, USA (19 Sep 1982).

This paper discusses the global carbon cycle in terms of quantitative relationships between empirical observations of the atmosphere, oceans and biosphere. Since my own studies have focused on the atmosphere and near surface ocean waters, I will develop the topic with emphasis on the atmospheric carbon cycle and air-sea interactions. Respondents are invited to fill in gaps in the presentation, especially with regard to the land biosphere. The marine biosphere will be regarded as part of the oceans, discussed only indirectly.

21694 (CONF-820970—, pp II.91-II.122) **Transient tracers in the ocean North Atlantic study: a progress report.** Brewer, P.G. (National Science Foundation, Washington, DC). Feb 1983. NTIS, PC A23/MF A01.

From Carbon dioxide research conference: carbon dioxide, science and consensus; Berkeley Springs, WV, USA (19 Sep 1982).

The TTO (Transient Tracers in the Ocean) study in the North Atlantic in 1981 was a major experiment carried out by a group of chemical and physical oceanographers to investigate the manner and time scale of ocean mixing, as deduced from the distribution of radiochemical tracers injected into the atmosphere, and thence the ocean, in the period 1958-1962 from nuclear bomb tests. These observations, coupled with careful investigation of oceanic CO_2 properties, provide unique constraints on ocean uptake of fossil fuel CO_2 and are reviewed.

21695 (CONF-821169—1) **Experimental evaluation of NO/sub x/ control using a glass tank simulator.** Abbasi, H.A.; Khinkis, M.J.; Waibel, R.T.; Boyd, W.D. (Institute of Gas Technology, Chicago, IL (USA); Southern California Gas Co., Los Angeles (USA)). 1982. 46p. Inst. of Gas Tech., 3424 South State Street-IIT Center, Chicago, IL 60616.

From 43. glass problems conference; Columbus, OH, USA (10 Nov 1982).

This paper discusses the results of tests conducted on a 1/4-scale glass melter firing port to determine the effects of various burner operating parameters on NO/sub x/ mission levels. The burner port was designed for a firing rate of 3 million Btu/hr in consultation with a container glass manufacturer and was tested on a pilot-scale furnace. The furnace was operated at temperatures generally found in glass melters (2600° to 2850°F). The furnace temperature was adjusted using water-cooling tubes as a load. We investigated combustion air preheat temperature (1600°F to 2200°F), air/fuel ratio (fuel rich to 8% excess oxygen), fuel injection velocity, turndown, and flue-gas recirculation (5% and 10%) and furnace wall temperature. NO/sub x/ levels decreased significantly with decreasing combustion air preheat temperature, decreasing furnace refractory temperature, and decreasing excess oxygen levels below 5% to 6%. Above 5% to 6% oxygen, the NO/sub x/ levels decreased with increasing oxygen levels. Though not as significant, NO/sub x/ levels were also reduced by varying degrees at reduced firing rate, reduced fuel injection velocity, and with flue-gas recirculation.

21696 (CONF-830216—2) **Interactive effects of acid rain and gaseous air pollutants on natural terrestrial vegetation.** McLaughlin, S.B.; Baes, C.F. III; McConathy, R.K.; Sigal, L.L.; Walker, R.F. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 12p. NTIS, PC A02/MF A01. Order Number DE83007507.

From Acid rain program review meeting; Raleigh, NC, USA (21 Feb 1983).

Results of the multielemental analysis of tree rings have indicated that accumulation patterns of trace elements differ widely between elements and between tree species. Many elements show patterns of increasing concentration in recent tissues with some elements such as zinc and chromium showing steady increases (in the Oak Ridge, Tennessee area) over the past 30 years. Highest levels of aluminum, zinc, copper, and chromium occur in most recent tissues of shortleaf pine and are at levels of potential concern for adverse effects to metabolically active tissues.

21697 (CONF-8204111—1) **Hydroscopic and hydrate water in aerosols and their effect on fine-particle mass and on atmospheric extinction.** Rote, D.M. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 24p. NTIS, PC A02/MF A01. Order Number DE83007672.

From Workshop on hygroscopic aerosols in the planetary boundary layer; Vail, CO, USA (13 Apr 1982).

Regression analyses of a large body of fine-particle mass (FP mass) and fine-particle sulfate ion ($FPSO_4$/sup =/) concentration data have shown that for a regression equation of the form, chi/sub FPmass/ = a + b.Chi/sub $FPSO_4$/sup =/, the slope (b) ranges from 1.8 to 2.53 depending on the time of year. Values of r^2 obtained from these regression fits ranged from 0.79 to 0.84. The regression line slope is of special interest because it measures the ratio of that portion of the fine particle mass that is correlated with the sulfate ions to the mass of the sulfate ions. A simple model of a fine particle atmospheric aerosol containing a mixture of sulfuric acid, ammonium bisulfate, and ammonium sulfate with a ratio of ammonium ions to SO_4/sup =/ of about 1.25 would lead to a ratio of total sulfate mass to SO_4/sup =/ mass of about 1.24. Comparing this ratio with the ratio of that portion of the FP mass that is correlated with the sulfate ions to the mass of the SO_4/sup =/ shows a considerable discrepancy. The question therefore arises as to how to account for the numerical range of 1.8 to 2.53 of the mass ratio obtained from the regression analyses. By invoking some plausible assumptions regarding mixtures including both hygroscopic water and hydrated states of sulfate compounds, a model is hypothesized that is able to account for mass ratio of about 1.64 +- 0.33. An additional hypothesis is invoked to explain the occurrence of higher mass ratios. The results of this aerosol model were combined with a long-range transport sulfate model and a visual range algorithm to predict visual ranges over eastern United States for various relative humidities. Numerical results are presented.

21698 (DOE/EP/12079—T4) **Finalization of reports entitled Updated Acid Rain Information Book and Simplification Approaches to Protecting PSD Class I Areas.** (GCA Corp., Bedford, MA (USA). GCA Technology Div.). 15 Mar 1983. Contract AC01-82EP12079. 10p. NTIS, PC A02/MF A01. Order Number DE83008771.

GCA/Technology Division has submitted several draft final reports to DOE's Environmental Issues Division (EID), including the Updated Acid Rain Information Book, and Simplified Approaches to Protecting PSD Class I Areas. The work of this task consists of revising these draft final reports incorporating the comments received as a result of DOE's participation in the Interagency Task Force on Acid Rain. A schedule of work, the project organization chart, and cost estimates are included.

21699 (DOE/METC—83-51) **Particulate sampling and characterization. Extractive sampling in situ characterization available instrumentation.** (Department of Energy, Morgantown, WV (USA). Morgantown Energy Technology Center). 1981. 404p. (CONF-8106270—). NTIS, PC A18/MF A01. Order Number DE83005672.

From DOE contractor's workshop on particulate sampling and characterization; Morgantown, WV, USA (16 Jun 1981).

The first part of these proceedings deals with particulate sampling under high temperature and high pressure conditions and the measurement of the particle size distribution. The second part deals with sample dilution, turbulent pipe flow, resolution of particle sizing instruments, and fine particle behavior and characterization. The third part describes the instrumentation available for particulate sampling in stacks or ducts, a particle size impactor for heavily loaded gas streams, and several instruments for on-line monitoring and sizing of particulates. Separate abstracts were prepared for most of the papers presented at this meeting. (CKK)

21700 (DOE/METC—83-51, pp 17-28) **Dust sampling at high temperature and pressure.** Markoja, R.L.; Shackleton, M.A. (Acurex Corp., Mountain View, CA). 1981. NTIS, PC A18/MF A01.

From DOE contractor's workshop on particulate sampling and characterization; Morgantown, WV, USA (16 Jun 1981).

One critical problem requiring solution in developing fossil energy processes is particulate removal at high temperature and pressure. To evaluate performance of hot gas cleaning devices, it has been necessary to develop particle sampling equipment for use under the temperature and pressure extremes encountered. Acurex Corp. has developed particle sampling equipment for a number of difficult environments, including the experimental pressurized fluidized bed combustor operated by International Energy Agency Grimethorpe in England. This paper is a description of the sampling needs and objectives at Grimethorpe, and a detailed description of these automated sampling devices.

21701 (DOE/METC—83-51, pp 29-42) **Sampling procedures used at the Westinghouse high temperature and pressure particulate control test facility.** Ciliberti, D. (Westinghouse Electric Corp., Pittsburgh, PA). 1981. NTIS, PC A18/MF A01.

From DOE contractor's workshop on particulate sampling and characterization; Morgantown, WV, USA (16 Jun 1981).

This paper describes test facilities and their operation for the testing of particulate samplers in a process stream. The system consists of a fairly large pressure vessel and associated piping which can operate between 200 to 1600°F and 0 to 150 psig and has provisions for injection of virtually any dust type, size, and rate, for sampling at all vessel inlet and outlet points, and for adding sulfur and/or alkali metal compounds in fuel. It can test conventional or rotary flow cyclones, granular bed filters, barrier or bag type ceramic filters, and electrostatic precipatators. A cascading impactor is used for size distribution measurements. Problems associated with the system are discussed. (CKK)

21702 (DOE/METC—83-51, pp 43-64) **Measurement techniques for combustion aerosols.** Shaw, D.T.; Kasper, G. (State Univ of New York, Buffalo). 1981. NTIS, PC A18/MF A01.

From DOE contractor's workshop on particulate sampling and characterization; Morgantown, WV, USA (16 Jun 1981).

Among the most prominently investigated sources of actual of potential combustion aerosols are automotive emissions, fossil fuel burning, and nuclear accident related fires. Despite differences in composition and origin, aerosols from combustion processes have on property in common: the individual particles tend to be highly irregular. In many cases, branched chain-like aggregates consisting of thousands of primary particles are formed. It is apparent that the spherical particle is an inadequate model for the description of particle dynamics of motion and other physico-chemical processes for these combustion aerosols. It also raises questions regarding meaningful interpretation and comparison of size distribution data obtained by the various types of sampling and classifying instruments in current use. This paper discusses the effects of irregular shape on two particle size classifiers, a Cylindrical Aerosol Centrifuge and a 9-stage low pressure impactor. (CKK)

21703 (DOE/METC—83-51, pp 65-97) **Problem areas in the determination of particle size distribution using inertial classifiers.** McCain, J.D. (Southern Research Inst., Birmingham, AL). 1981. NTIS, PC A18/MF A01.

From DOE contractor's workshop on particulate sampling and characterization; Morgantown, WV, USA (16 Jun 1981).

Southern Research Institute has been involved in the development and application of inertial particle size classifiers, both cyclonic and impaction, for a number of years. During the course of this work several problem areas have been found in applying inertial sizing devices in industrial source sampling in general, together with some specific problems with regard to high temperature operations. The two major areas to be discussed are: (1) size selective transport losses in probes and sampling nozzles, and (2) difficulties in predicting stage cut diameters at high temperatures. The latter is especially troublesome with cyclone separators. With regard to probe and nozzle losses gravitational settling and horizontal probes can be significant and impaction losses in bent or buttonhook (gooseneck) nozzles have been shown to induce unacceptably large biases in field data. A right angle precollector has been designed which may effectively eliminate the nozzle difficulty.

21704 (DOE/METC—83-51, pp 125-147) **Extractive sampling with dilution probes.** Ensor, D.S.; Ranade, M.B.; Lawless, P.A.; VanOsdell, D.W.; Damle, A.S. (Research Triangle Inst., Research Triangle Park, NC). 1981. NTIS, PC A18/MF A01.

From DOE contractor's workshop on particulate sampling and characterization; Morgantown, WV, USA (16 Jun 1981).

Dilution probes are used to precondition combustion gases prior to measurement of the aerosol size distribution by electrical aerosol analyzers, optical particle counters, and condensation nuclei counters/diffusion batteries. The guidelines for dilution system design are described to minimize artifacts from particle wall losses, coagulation, and formation. Two field portable systems used by the author are described. Included are system aerosol calibration and field test experience.

21705 (DOE/METC—83-51, pp 148-178) **Sampling experiments in a turbulent pipe flow.** Bajura, R.A.; Lutz, S.A.; Stenger, J.B.; Svinos, J.G. (West Virginia Univ., Morgantown). 1981. NTIS, PC A18/MF A01.

From DOE contractor's workshop on particulate sampling and characterization; Morgantown, WV, USA (16 Jun 1981).

A series of experiments was conducted using sampling probes to evaluate measurement errors associated with non-isokinetic aspiration rates. The sampled streams were lightly loaded glass bead aerosols consisting of approximately monodisperse particles having mass mean diameters of 3.0, 5.3, and 7.4 microns. The experiments were done in a 4-inch I.D. round pipe using a dual probe arrangement to obtain simultaneous measurements under both isokinetic and non-isokinetic conditions. Stokes numbers varied over a range of 0.02 to 0.24 for probes of two different internal diameters. The trends in the experimental data are in general agreement with data for higher Stokes numbers reported previously in the literature. No apparent differences in sampling accuracy were found when the probes were stationed at the 0.50 and 0.75 radius locations off the centerline. Effects due to the thickness of the sampling probes were observed for all tests with the general result that the concentration measurement was lower in value as the thickness of the probe was increased. Deposition on the probe tip and within the body of the probe accounted for a major portion of the losses in the sample train.

21706 (DOE/METC—83-51, pp 179-188) **Instrument resolution.** Loos, H.G. (Laguna Research Lab., Laguna Beach, CA). 1981. NTIS, PC A18/MF A01.

From DOE contractor's workshop on particulate sampling and characterization; Morgantown, WV, USA (16 Jun 1981).

This paper describes the calculation of the resolution of instruments which measure particle size distributions. It is shown that increasing the number of channels of the instrument causes the signal-to-noise degradation to increase while the coverage of the size distribution becomes better. To decide on tradeoffs, the kind of physical measurement being performed must be considered. Parallel measurements as opposed to the customary serial measurements of an aerosol should be considered also. Large improvements in instrument resolution may often be made by using automated readout and control by a computer. If the number of measurements is increased by a factor of N, the standard deviation in the data average is diminished by a factor of root N. (CKK)

21707 (DOE/METC—83-51, pp 189-200) **Physical and chemical characterization of fine particle in off-gases from coal combustion and oil shale retorting.** Ondov, J.M. (Lawrence Livermore National Lab., CA). 1981. NTIS, PC A18/MF A01.

From DOE contractor's workshop on particulate sampling and characterization; Morgantown, WV, USA (16 Jun 1981).

Accompanying the extraction of energy by virtually all of our fossil technologies are by-products aerosols containing toxic and carcinogenic substances on particles of respirable size. Concern for the atmospheric release and effects on human health resulting from subsequent inhalation of these particulate substances has fostered extensive research into process and control technology, atmospheric physics and chemistry, and inhalation toxicology. Indeed, we have been funded by the US DOE to study the physical and chemical properties of process aerosols from coal and oil facilities. The purpose of this work is to develop the source terms of toxic substances for human inhalation dosimetry and to elucidate mechanisms of particles formation and chemical enrichment. In this paper discussed some of the chemical and physical aerosol measurement undertaken in this work.

21708 (DOE/METC—83-51, pp 302-340) **Development of an in-situ real-time particulate monitoring system for application in hostile environments.** Bachalo, W.D.; Poon, C.C. (Spectron Development Labs. Inc., Costa Mesa, CA). 1981. NTIS, PC A18/MF A01.

From DOE contractor's workshop on particulate sampling and characterization; Morgantown, WV, USA (16 Jun 1981).

Development of the Integrated Particle Sizing System for particulate monitoring in high temperature, high pressure environments is described in this paper. This system, based on two laser light scatter detection techniques offers significant advantages over intrusive sampling techniques when applied to hostile environments. Current developments have been directed toward improving the instrument's performance in industrial environments and simplifying its operation. To this end, significant improvements have been realized in the electronics processing systems, the data handling, and the software. Results obtained during the 100-hour test conducted with the instrument prior to delivery to Morgantown will be reviewed.

21709 (DOE/METC—83-51, pp 341-364) **On-line particulate measurement system for hot pressurized gas streams utilizing laser spectrometers.** Brown, A.; Mohnen, V.A. (State Univ. of New York, Albany). 1981. NTIS, PC A18/MF A01.

From DOE contractor's workshop on particulate sampling and characterization; Morgantown, WV, USA (16 Jun 1981).

The design of a particulate measurement system to measure the particulate loading in hot (1000°F) pressurized (up to 20 atmospheres) gas streams is described. The system will be installed in the coal gasifier system at the Morgantown Energy Technology Center during the fall of 1981 and used to determine the particle separation efficiency of a developmental particulate removal device (a cyclocentrifuge). The heart of the system is a pair of laser spectometers through which isokinetic sample streams are passed. Particle Measurement Systems Incorporated has developed the spectrometer to permit the particle size and concentration in hot pressurized gas to be measured with a laser-optical system that has been used extensively in less severe gas environments.

21710 (DOE/METC—83-51, pp 365-383) **Application of optical particle measuring systems to high temperature/high pressure process streams.** Knollenberg, R.G. (Particle Measuring Systems, Inc., Boulder, CO). 1981. NTIS, PC A18/MF A01.

From DOE contractor's workshop on particulate sampling and characterization; Morgantown, WV, USA (16 Jun 1981).

Several types of instrument techniques are described for measuring process stream aerosols. The techniques include both extractive sampling at ambient and high pressure and in-situ sampling under ambient process conditions. All techniques are capable of operation of hih temperatures. Size ranges cover 0.3 to 20 microns.

21711 **(DOE/NBM—3008209) Nature of stack emissions from the experimental-scale combustion of crude oil.** Clark, B.R.; Horton, A.D.; Higgins, C.E. (Oak Ridge National Lab., TN (USA)). 1978. Contract W-7405-ENG-26. 24p. NTIS, PC A02/MF A01. Order Number DE83008209.

A series of four combustion tests was made with two crude shale oils. Various combustion parameters were measured to assess the combustion behavior by comparison with similar petroleum fuels. Stack emissions were measured with permanent on-line equipment as well as some specially designed apparatus for collecting volatile organic compounds on solid adsorbents for subsequent analysis. The shale oils burned like typical distillate fuel oils with boiler efficiencies comparable to a No. 6 oil. The stack emissions were considerably different in content from those resulting from the combustion of petroleum fuels. Overall hydrocarbon emissions were quite low, but NO/NO/sub X/ emissions were high, reflecting the large nitrogen content of these oils.

21712 (GSF-BPT—2/81) **Influences of environmental chemicals on the climate and biological after-effects.** (Kiel Univ. (Germany, F.R.). Pharmazeutisches Inst.). May 1981. 218p. (In German). (CONF-8010316—). NTIS (US Sales Only), PC A10/MF A01. Order Number DE83750301.

From 2. seminar of the Gesellschaft fuer Strahlen- und Umweltforschung; Neuherberg, F.R. Germany (27 Oct 1980).

The complexity of ecological systems cannot be described by a few simple parameters, the more as recognition of the hazards to the environment from pollutants by means of the changed parameters is extremely difficult. Atmospheric substances such as CO_2, H_2O, ozone and aerosols exert a direct influence on the radiation balance. The effect of concentration modifications of the air pollutants e.g. on the temperature of the atmosphere can be assessed with certain restrictions by means of mathematical models. The present brochure contains papers on this subject which were delivered at the second status seminar of the Gesellschaft fuer Strahlen- und Umweltforschung - GSF in Munich in October 1980.

21713 (GSF-BPT—2/81, pp 13-24) **Effects of anthropogenic chlorine hydrocarbons on the stratospheric ozone layer.** Ehhalt, D.H.; Schmidt, U. May 1981. (In German). NTIS (US Sales Only), PC A10/MF A01.

From 2. seminar of the Gesellschaft fuer Strahlen- und Umweltforschung; Neuherberg, F.R. Germany (27 Oct 1980).

Stratospheric measurements have so far been carried out only for the gaseous chlorine sources $CFCl_3$, CF_2Cl_2 and CH_3Cl (initiated by industrial plants). They show marked gradients for all three gases above the tropopause. By measurement of the ratios of the reactive chlorine compounds Cl and ClO as well as of the reaction products HOCl, HCl and $ClONO_2$ formed in the reaction cycles, it is possible to check chlorine chemistry modelling even in its details.

21714 (GSF-BPT—2/81, pp 25-30) **Measurement of ions, trace gases and precondensation nuclei in the stratosphere by mass spectroscopy.** Arnold, F.; Henschen, G.; Fabian, R. May 1981. (In German). NTIS (US Sales Only), PC A10/MF A01.

From 2. seminar of the Gesellschaft fuer Strahlen- und Umweltforschung; Neuherberg, F.R. Germany (27 Oct 1980).

By means of passive chemo-ionisation mass spectrometry (PACIMS), a number of neutral trace gases could be detected in the stratosphere during balloon-borne measurements and quantitatively determined. In the entire range between 23 km and 42 km, cluster ions with the central ions H_3O^+, Hx^+ are dominant. Furthermore particles with at least 700 atomic mass units were detected representing probably multi-ion complexes.

21715 (GSF-BPT—2/81, pp 31-40) **Vertical distribution of CH_3Cl, CF_2Cl_2 and $CFCl_3$ in the stratosphere.** Schmidt, U.; Rudolph, J.; Johnen, F.J.; Ehhalt, D.H.; Volz, A.; Roeth, E.P.; Borchers, R.; Fabian, P. May 1981. (In German). NTIS (US Sales Only), PC A10/MF A01.

From 2. seminar of the Gesellschaft fuer Strahlen- und Umweltforschung; Neuherberg, F.R. Germany (27 Oct 1980).

The mixing ratios of CH_3Cl, $CFCl_3$ and CF_2Cl_2 in stratospheric air samples collected by a cryogenic sampling device during three balloon flights over southern France were measured. The mixing ratio of CH_3Cl decreases by a factor 10 in heights between 20 and 30 km. The vertical profiles for the two chlorine source gases $CFCl_3$ and CF_2Cl_2 show the typical marked gradients in the stratosphere above a height of 20 km.

21716 (GSF-BPT—2/81, pp 41-53) **Vertical distribution of stable trace gases in mean latitudes.** Fabian, P.; Borchers, R.; Schmidt, U.; Volz, A.; Seiler, W. May 1981. (In German). NTIS (US Sales Only), PC A10/MF A01.

From 2. seminar of the Gesellschaft fuer Strahlen- und Umweltforschung; Neuherberg, F.R. Germany (27 Oct 1980).

Separately according to years, the volume mixing ratios of H_2, CH_4, CO, N_2O, $CFCl_3$ and CF_2Cl_2 were determined as a function of the height over southern France by means of balloon-borne cryo-collectors. Mainly above 25 km and in the area of the tropopause, year-by-year deviations of details occur which are attributed to dynamic processes.

21717 (GSF-BPT—2/81, pp 54-61) **Measurement of RO_2 and NO_2 in the troposphere by means of ESR and matrix isolation.** Mihelcic, D.; Muesgen, P.; Paetz, W.; Helten, M.; Trainer, M.; Fark, H.; Kempa, D.; Ehhalt, D.H. May 1981. (In German). NTIS (US Sales Only), PC A10/MF A01.

From 2. seminar of the Gesellschaft fuer Strahlen- und Umweltforschung; Neuherberg, F.R. Germany (27 Oct 1980).

The method of matrix isolation with subsequent analysis by ESR spectroscopy was used for simultaneous determination of RO_2 and NO_2 in the troposphere. The measurements provided mixing ratios of RO_2 radicals and the day and night course of NO_2 and RO_2 radicals in the Juelich-Bonn area in 1 to 6 km height. For the first time RO_2 radicals were found at night.

21718 (GSF-BPT—2/81, pp 62-70) **Measurements of ethane and propane in the troposphere and stratosphere.** Rudolph, J.; Ehhalt, D.H.; Toennissen, A. May 1981. (In German). NTIS (US Sales Only), PC A10/MF A01.

From 2. seminar of the Gesellschaft fuer Strahlen- und Umweltforschung; Neuherberg, F.R. Germany (27 Oct 1980).

Sufficiently precise measurements of C_2H_6 in the stratosphere are a useful method to determine the mean Cl concentration in the lower stratosphere. They were carried out with the aid of a cryogenic sampler over southern France. As about half of the ozone destruction by ClOsub(x) takes place below 30 km, information on the Cl concentration at lower altitudes is of decisive interest. Contamination problems can be solved and measurement of C_2H_6 can be extended to heights of 35 km.

21719 (GSF-BPT—2/81, pp 71-73) **ESR spectra of ClO in a CO_2 matrix.** Trainer, M.; Fark, H.; Helten, M.; Kempa, D.; Mihelcic, D.; Muesgen, P.; Paetz, H.W.; Ehhalt, D.H. May 1981. (In German). NTIS (US Sales Only), PC A10/MF A01.

From 2. seminar of the Gesellschaft fuer Strahlen- und Umweltforschung; Neuherberg, F.R. Germany (27 Oct 1980).

The experiments using a CO_2 matrix have shown that the ESR spectrum of ClO can be observed in a molecular matrix. The limit of detection is in the range of 1-5 x 10^{14} ClO spins so that ClO detection in the stratosphere is possible.

21720 (GSF-BPT—2/81, pp 74-76) **Measurement of HO_2 and NO_2 in the stratosphere by means of ESR and matrix isolation.** Helten, M.; Paetz, W.; Trainer, M.; Kempa, D.; Fark, H.; Mihelcic, D.; Ehhalt, D.H. May 1981. (In German). NTIS (US Sales Only), PC A10/MF A01.

From 2. seminar of the Gesellschaft fuer Strahlen- und Umweltforschung; Neuherberg, F.R. Germany (27 Oct 1980).

In two balloon flights a height profile between 17 km and 34 km was obtained. For measurement of the samples a He-cooled evaporator cryostat was used, by which it is possible to cool down samples in the ESR spectrometer to 4 K.

21721 (GSF-BPT—2/81, pp 77-84) **Measurements of the vertical ozone content of the free atmosphere above 20 km height over the Mount Hohenpeissenberg.** Attmannspacher, W. May 1981. (In German). NTIS (US Sales Only), PC A10/MF A01.

From 2. seminar of the Gesellschaft fuer Strahlen- und Umweltforschung; Neuherberg, F.R. Germany (27 Oct 1980).

For the measurements a Brewer-Mast-type wet chemical sensor was used. The investigations, carried on for six years, have shown that there may possibly be an influence of solar processes on the vertical profile of the ozone.

21722 (GSF-BPT—2/81, pp 85-92) **Ubiquitous concentration of C_1-C_6 organochlorine compounds in the non-polluted atmosphere.** Kirschmer, P.; Ballschmiter, K. May 1981. (In German). NTIS (US Sales Only), PC A10/MF A01.

From 2. seminar of the Gesellschaft fuer Strahlen- und Umweltforschung; Neuherberg, F.R. Germany (27 Oct 1980).

The analytical method used consisted in the concentration of greater volumes while using capillary gas chromatography which provides large spectral dispersion, with alternative detection by ECD or FiD. The investigations show a complex base in the lower troposphere, most probably organic chlorine compounds in the C_2-C_6-range.

21723 (GSF-BPT—2/81, pp 98-102) **Field measurements of N_2O emission rates from fertilized and non-fertilized soils.** Seiler, W.; Conrad, R. May 1981. (In German). NTIS (US Sales Only), PC A10/MF A01.

From 2. seminar of the Gesellschaft fuer Strahlen- und Umweltforschung; Neuherberg, F.R. Germany (27 Oct 1980).

The field measurements were carried out in the surroundings of the city of Mainz. The established vertical N_2O profiles in the soil show that N_2O emitted from the soil into the atmosphere is formed directly on the soil surface or in the uppermost soil layer. After fertilizing with mineral fertilizers the N_2O emission rate actually is increased but the gradient of the N_2O profile in the soil remains uninfluenced. Thus, the flow of N_2O into the atmosphere cannot be dependent on the gradient of N_2O in the soil.

21724 (GSF-BPT—2/81, pp 103-113) **Determination of traces of HCl in the troposphere and stratosphere.** Baechmann, K.; Vierkorn-Rudolph, B. May 1981. (In German). NTIS (US Sales Only), PC A10/MF A01.

From 2. seminar of the Gesellschaft fuer Strahlen- und Umweltforschung; Neuherberg, F.R. Germany (27 Oct 1980).

The difference between total HCl and HCl in aerosols was determined by sampling with the aid of adsorption tubes; the derivatization of HCl was carried out with 7-oxabicyclo-(4.1.0.)-heptane and by separating the occurring 2-chlorocyclohexanol using gas chromatography. Sampling was done from airplanes and balloons.

21725 (GSF-BPT—2/81, pp 117-127) **Diurnal variations of short-lived trace substances.** Fabian, P.; Pyle, J.A.; Wells, R.J. May 1981. (In German). NTIS (US Sales Only), PC A10/MF A01.

From 2. seminar of the Gesellschaft fuer Strahlen- und Umweltforschung; Neuherberg, F.R. Germany (27 Oct 1980).

The main interest is on the simulation of diurnal variations of HOsub(x), NOsub(x) and ClOsub(x) radicals and their decay products such as NO_3, N_2O_5, HNO_3, $ClONO_2$, HCl and H_2O_2. The model uses zonal mean values of all variables as a function of geographic longitude and latitude with a latitudinal resolution of II/19 from pole to pole and a height resolution of 0.5 loge from the soil to 60 km of height.

21726 (GSF-BPT—2/81, pp 128-132) **Calculation models on stratospheric ion processes.** Joos, W.; Arnold, F. May 1981. (In German). NTIS (US Sales Only), PC A10/MF A01.

From 2. seminar of the Gesellschaft fuer Strahlen- und Umweltforschung; Neuherberg, F.R. Germany (27 Oct 1980).

The model solves the steady-state continuity equations whilst neglecting the transport terms of the positive ions H_3O^+ (H_2O)sub(n) and Hx^+ xsub(L)(H_2O)sub(m) for different seasons between 10 and 50 km, the negative ions NO_3^- (HNO_3)sub(i) and the multi-ion complexes. The results obtained are useful for better understanding of ion compositions measured in situ and for planning future field measurements.

21727 (GSF-BPT—2/81, pp 133-138) **Structure and analysis of models for atmospheric reaction kinetics.** Roeth, E.P. May 1981. (In German). NTIS (US Sales Only), PC A10/MF A01.

From 2. seminar of the Gesellschaft fuer Strahlen- und Umweltforschung; Neuherberg, F.R. Germany (27 Oct 1980).

The models are to make sensitivity studies possible in order to determine the modification of height profiles of concentrations of individual components upon modification of reaction constants. The models have modular character and contain, apart from the steady-state model, a long-term model for prognosis purposes and a short-term model for the interpretation of measuring results.

21728 (GSF-BPT—2/81, pp 141-145) **Investigations on the reaction systems HOsub(X)/ClOsub(X)/NOsub(X) under tropospheric and stratospheric conditions.** Becker, K.H.; Fink, E.H. May 1981. (In German). NTIS (US Sales Only), PC A10/MF A01.

From 2. seminar of the Gesellschaft fuer Strahlen- und Umweltforschung; Neuherberg, F.R. Germany (27 Oct 1980).

The investigations were carried through with a coolable photochemical reactor, with that system it is possible to determine concentrations of the trace matters down to approximately 0.1 ppm in situ by measuring the absorption spectra in the range of 500-3,500 cm^{-1}. For the latter a built-in FTIR spectrometer was used.

21729 (GSF-BPT—2/81, pp 146-156) **Reaction rates and channel ratios of photochemical processes in the atmosphere.** Marx, W.; Monkhouse, P.; Schurath, U. May 1981. (In German). NTIS (US Sales Only), PC A10/MF A01.

From 2. seminar of the Gesellschaft fuer Strahlen- und Umweltforschung; Neuherberg, F.R. Germany (27 Oct 1980).

The portion of formaldehyde photolysis frequency forming radicals amounts to 25-30 per cent in the troposphere near the ground. On photolysis of pure acetaldehyde in the atmosphere, CO with about 10 per cent H_2 was found by mass spectroscopy as noncondensable product. The measurements were carried out in a specially constructed appliance.

21730 (GSF-BPT—2/81, pp 157-161) **Photo- and electron-induced halogenation from CF_2Cl_2 and $CFCl_3$.** Schenk, H.; Illenberger, E.; Baumgaertel, H. May 1981. (In German). NTIS (US Sales Only), PC A10/MF A01.

From 2. seminar of the Gesellschaft fuer Strahlen- und Umweltforschung; Neuherberg, F.R. Germany (27 Oct 1980).

With the aid of an appliance for mass spectroscopy by photo-ionization, the formation of negative ions from CF_2Cl and $CFCl_3$ under synchroton radiation was investigated. For the atmospheric chemistry of CF_2Cl_2, photo-induced pair generation and dissociative electron attachment are of minor importance owing the small cross sections.

21731 (GSF-BPT—2/81, pp 162-170) **Reaction kinetics of oxygen atoms and hydroxyl radicals with tetrachlorethylene.** Kirchner, K.; Vogt, S. May 1981. (In German). NTIS (US Sales Only), PC A10/MF A01.

From 2. seminar of the Gesellschaft fuer Strahlen- und Umweltforschung; Neuherberg, F.R. Germany (27 Oct 1980).

The investigations were carried out with a flow tube reactor-molecular jet sampling - and a system for mass spectroscopy. Comparison of the speed constants at room temperature showed that the hydroxyl radicals reacted about 10 times faster with C_2Cl_4 than the oxygen atoms. At a mean hydroxyl concentration of 3 x 10^6 particles per ml the half-life period of the C_2Cl_4 in this reaction process was found to be about 350 h. This indicates that the C_2Cl_4 in the lower atmosphere is reduced above all by hydroxyl radicals.

21732 (GSF-BPT—2/81, pp 171-175) **Photolysis rates of chlorine nitrate.** Knauth, H.D.; Schindler, R.N. May 1981. (In German). NTIS (US Sales Only), PC A10/MF A01.

From 2. seminar of the Gesellschaft fuer Strahlen- und Umweltforschung; Neuherberg, F.R. Germany (27 Oct 1980).

All investigations were carried out under stationary conditions at $ClONO_2$ pressures of 5-10 Torr and at temperatures of +20 to -30 centigrades. All the experiments showed that the dissociation channel $ClONO_2+h \rightarrow Cl+NO_3$ is predominant in the photolysis of chlorine nitrate.

21733 (GSF-BPT—2/81, pp 176-179) **Laboratory measurements of kinetical and thermodynamical data of atmospheric ion-molecule collisions.** Boehringer, H.; Arnold, F. May 1981. (In German). NTIS (US Sales Only), PC A10/MF A01.

From 2. seminar of the Gesellschaft fuer Strahlen- und Umweltforschung; Neuherberg, F.R. Germany (27 Oct 1980).

The measurements help to understand better the atmospheric ion chemistry. They are carried out with an ion drift tube apparatus suitable to detect reaction speed coefficients and equilibrium constants in the temperature range 40-400 K. The ions $H_3O^+(CH_3CN)_3$ and $H^+(H_2O)_2(CH_3CN)_4$ stand out by their extraordinary stability.

21734 (GSF-BPT—2/81, pp 180-181) **Investigations on the behaviour of organic fluorine compounds on surfaces.** Illenberger, E. May 1981. (In German). NTIS (US Sales Only), PC A10/MF A01.

From 2. seminar of the Gesellschaft fuer Strahlen- und Umweltforschung; Neuherberg, F.R. Germany (27 Oct 1980).

F11 was examined on a pure iron surface by means of photoelectron spectroscopy and F12 on an iron oxide surface by means of Auger electron spectroscopy. The experiments showed that F12 on an iron oxide surface is significantly more stable.

21735 (GSF-BPT—2/81, pp 93-97) **Release of N_2O from cultivated soils.** Heinemeyer, O.; Jagnow, G. May 1981. (In German). NTIS (US Sales Only), PC A10/MF A01.

From 2. seminar of the Gesellschaft fuer Strahlen- und Umweltforschung; Neuherberg, F.R. Germany (27 Oct 1980).

The attempt was made to ascertain the actual scale of N_2O immission into the atmosphere by direct measurements according to the 'soil cover method', in order to make detailed forecasts on the prospective development of the ozone shield. There was not always a marked direct connexion between the application of nitrogen fertilizer and subsequent N_2O release. Other influence quantities such as soil humidity and temperature are surely important too.

21736 (K/PS—5003S) **Cooling tower drift deposition measurement at the ORGDP.** Park, S.H. (Oak Ridge Gaseous Diffusion Plant, TN (USA)). 1983. Contract W-7405-ENG-26. 5p. (CONF-830411—1). NTIS, PC A02/MF A01. Order Number DE83005878.

From 29. Institute of Environmental Sciences technical meeting; Los Angeles, CA, USA (18 Apr 1983).

In a continuing effort to investigate cooling tower drift, droplet and mineral deposition fluxes were measured near the cooling towers at the Oak Ridge Gaseous Diffusion Plant (ORGDP) from 1979 to 1982. These measurements were conducted at various times of the year to determine any seasonally induced variation in the deposition pattern. The parameters which affected the deposition flux to the greatest degree were the wind speed and the relative humidity of the ambient air. The chromium deposition flux, as measured by collection in Petrie dishes around the cooling tower, displays two distinctly different regimes for the rate of change of flux with distance. In the near field, up to 600 meters, the approximate rate of decrease of the deposition flux is an order of magnitude per 100 meters; beyond this region, the rate is drastically lower. This chromium deposition rate in the near field agrees with the values obtained by the sensitive paper method, in which the mineral flux is determined from the droplet imprints and a known mineral concentration in the drift. Hence, it is hypothesized that the chromium deposition in the near field results from drift droplets whose trajectories are influenced by the gravity force as well as wind speed; whereas, the chromium deposition pattern beyond the near field is formed from particles whose trajectories depend greatly on the wind speed.

21737 (LBL—13500-Exc.) **Atmospheric aerosol research. Excerpt from the Energy and Environment Division annual report, FY 1981, Chapter 4.** (Lawrence Berkeley Lab., CA (USA)). Sep 1982. Contract AC03-76SF00098. 25p. NTIS, PC A02/MF A01. Order Number DE83004954.

Focus is directed toward characterization, formation and transformation as well as effects of aerosols on precipitation, visibility, and climate. (PSB)

21738 (LBL—13500-Exc., pp 4.2-4.5) **SO_2 oxidation of soot particles exposed to water.** Benner, W.H.; Ljungstrom, E.; Novakov, T. Sep 1982. NTIS, PC A02/MF A01. Contract AC03-76SF00098.

In Atmospheric aerosol research. Excerpt from the Energy and Environment Division annual report, FY 1981, Chapter 4.

The oxidation of SO_2 in the atmosphere leads to the formation of sulfuric acid, which, if incorporated into cloud and rain water and not neutralized by ammonia, can acidify the water. The oxidation of SO_3 can produce gas-to-particle transformations and can lead to haze formation. In the ambient atmosphere, SO_2 is oxidized by a variety of homogeneous and heterogeneous chemical reactions. The research reported here focuses on several heterogeneous (i.e., gas-droplet/particle) reaction pathways, using ambient samples collected from electrostatic precipitators.

21739 (LBL—13500-Exc., pp 4.7-4.10) **Carbon particles in the Arctic.** Rosen, H.J.; Novakov, T. Sep 1982. NTIS, PC A02/MF A01. Contract AC03-76SF00098.

In Atmospheric aerosol research. Excerpt from the Energy and Environment Division annual report, FY 1981, Chapter 4.

Recent studies in the Arctic show the presence of unexpectedly high aerosol concentrations, which appear to have a large anthropogenic component. To investigate the chemical composition, origins, and climatic impact of the aerosol, a collaborative sampling program was started by LBL and NOAA in October 1979. This program has emphasized the analyses of the carbonaceous aerosol and its optical properties, but it also has the capability to determine other major aerosol components. Preliminary results from this study show that large concentrations of combustion-generated particles are present in the Arctic and that they may have a significant impact on the heat balance over this region.

21740 (LBL—13500-Exc., pp 4.10-4.13) **Application of thermal analysis and photoelectron spectroscopy for the characterization of particulate matter.** Dod, R.L.; Novakov, T. Sep 1982. NTIS, PC A02/MF A01. Contract AC03-76SF00098.

In Atmospheric aerosol research. Excerpt from the Energy and Environment Division annual report, FY 1981, Chapter 4.

A technique that will analyze the bulk properties of particles was sought without chemical treatment or preseparation of the sample and to compare these results with ESCA results. Thermal analysis in the evolved-gas-analysis (EGA) mode was investigated.

21741 (LBL—13500-Exc., pp 4.13-4.16) **Theoretical studies of the thermal decomposition of carbonaceous aerosol particulates.** Hansen, A.D.A.; Novakov, T. Sep 1982. NTIS, PC A02/MF A01. Contract AC03-76SF00098.

In Atmospheric aerosol research. Excerpt from the Energy and Environment Division annual report, FY 1981, Chapter 4.

This report presents a theoretical approach to the interpretation of EGA of the graphitic carbon component of aerosol particles.

21742 (LBL—13500-Exc., pp 4.16-4.20) **Application of selective solvent extraction to carbonaceous aerosols.** Gundel, L.A.; Novakov, T. Sep 1982. NTIS, PC A02/MF A01. Contract AC03-76SF00098.

In Atmospheric aerosol research. Excerpt from the Energy and Environment Division annual report, FY 1981, Chapter 4.

Carbonaceous components of particles from New York City, Los Angeles, and Berkeley were very similar when characterized by the selective solvent extraction-carbon analysis technique. Photochemical activity, as indicated by ozone level, was much less intensive in Berkeley and New York City than in Los Angeles, although fractions of polar and nonpolar carbon are very similar for the two locations. Automotive and diesel primary combustion particles differ from ambient particles by enrichment in amounts of nonpolar carbon; however, significant fractions of polar carbon are also associated with all combustion sources studied here.

21743 (LBL—13500-Exc., pp 4.20-4.22) **Relation between concentrations of polynuclear aromatic hydrocarbons and black carbon.** Gundel, L.A.; Rosen, H.J.; Novakov, T. Sep 1982. NTIS, PC A02/MF A01. Contract AC03-76SF00098.

In Atmospheric aerosol research. Excerpt from the Energy and Environment Division annual report, FY 1981, Chapter 4.

In addition to black carbon, particulate organic carbon in ambient aerosols contains primary and secondary organic compounds. In this article, we study the relationship between black carbon concentration and one class of primary organic compounds, polynuclear aromatic hydrocarbons (PAH), in urban carbonaceous particles. These compounds and their oxidized derivatives may constitute part of the health hazards associated with ambient and source aerosols. Earlier work established that a linear relationship exists between concentrations of several polynuclear aromatic hydrocarbons and black carbon for ambient aerosol particles collected in Berkeley during the summer of 1980. Here we investigate that relationship for particles collected in three other sampling locations in the United States during the same season.

21744 (LBL—13500-Exc., pp 4.22-4.23) **Determination of low-z elements simultaneously by charged particle activation analysis.** McKinney, M.; Markowitz, S.S.; Novakov, T. Sep 1982. NTIS, PC A02/MF A01. Contract AC03-76SF00098.

In Atmospheric aerosol research. Excerpt from the Energy and Environment Division annual report, FY 1981, Chapter 4.

Nondestructive techniques have been developed for determining carbon, nitrogen and oxygen require lengthy use of accelerator or reactor time, and the latter method requires large samples. A deuterium activation method for simultaneously determining carbon, nitrogen, and oxygen in atmospheric aerosols by irradiating the sample with one type of charged particle was developed.

21745 (NUREG/CR—3106) **Comparison of five-minute radon-daughter measurements with long-term radon and radon-daughter concentrations.** Young, J.A.; Jackson, P.O.; Thomas, V.W. (Pacific Northwest Lab., Richland, WA (USA)). Jan 1983. Contract AC06-76RL01830. 37p. (PNL—4591). NTIS, PC A03/MF A01 - GPO $4.50. Order Number DE83007572.

Five-minute air filter radon daughter measurements were made in 84 buildings in Edgemont, South Dakota, in which annual average radon daughter concentrations have been determined from six 100-hour Radon Progeny Integrating Sampling Unit (RPISU) measurements. Averaging radon concentrations were also determined in 50 of these buildings using Terradex Track Etch detectors. The standard deviation of the difference between the (natural) logarithms of the RPISU annual averages and the logarithms of the air filter measurements (SD-ln) was found to be 0.52. This SD-ln is considerably smaller than the SD-ln of 0.71 between the RPISU annual averages and the air filter measurements reported by ALARA at Grand Junction, Colorado; presumably because a considerable number of air filter measurements in Edgemont were disregarded because of short turnover times or high wind speeds. Using the SD-ln of 0.52 it can be calculated that there would only be a 5% probability in Edgemont that the RPISU annual average would be greater than 0.015 WL if the five-minute measurement were equal to 0.010 WL. This indicates that the procedure used in Edgemont of clearing buildings from remedial action if the five-minute measurement were less than 0.010 WL was reasonable. There was about a 28% probability that the RPISU annual average would be less than 0.015 WL if the five-minute measurement were 0.033 WL, indicating that the procedure of performing an engineering assessment if the average of two five-minute measurements was greater than 0.033 WL was also reasonable. Comparison indicates that the average of two RPISU measurements taken six months apart would provide a dependable estimate of the annual average.

21746 (PB—81-179376) **US - Canada transboundary air pollution: Work Group 3A interium report on strategies and implementation.** (Environmental Protection Agency, Washington, DC (USA). Office of International Activities). 10 Feb 1981. 229p. NTIS.

This is an Interim Report prepared by a US/Canada Work Group in accordance with the memorandum of Intent on Transboundary Air Pollution concluded between Canada and the United States on August 5, 1980. This is one of a set of four reports which represent an initial effort to draw together currently available information on transboundary air pollution, with particular emphasis on acid deposition, and to develop a consensus on the nature of the problem and the measures available to deal with it. While these reports contain some information and analyses that should be considered preliminary in nature, they accurately reflect the current state of knowledge on the issues considered. Any portion of these reports is subject to modification and refinement as per review, further advances in scientific understanding, or the results of ongoing assessment studies become available.

21747 **(PB—81-200800) Controlling sulfur oxides.** (Environmental Protection Agency, Washington, DC (USA). Office of Research and Development). Aug 1980. 32p. (EPA—600/8-80-029). NTIS.

This Research Summary describes EPA's program to develop new and improve existing technologies for sulfur oxide control. As we increasingly turn to coal as the primary utility and industrial fuel, while trying to deal with the problems of acid precipitation, visibility degradation, and unhealthy air, we will have to confront the fact that most of the sulfur oxides emitted over the next two decades will come from plants existing today. If we vigorously pursue the successful demonstration of control technologies and then take advantage of them, especially those that can reduce emissions from existing plants, the adverse health and environmental effects of the troublesome sulfur oxides can be significantly reduced.

21748 **(PB—81-202673) Acid precipitation.** (National Oceanic and Atmospheric Administration, Washington, DC (USA). Environmental Data and Information Service). Feb 1981. 18p. (NOAA—81040201). NTIS.

In view of the nationally increasing use of coal and growing evidence of the detrimental effects of acid precipitation, the Federal Government is preparing a comprehensive 10-year acid-precipitation research plan to study environmental and atmospheric effects and to monitor precipitation acidity. Current issues relate to: the establishment of networks and standards for long-term monitoring and measurement of acid precipitation; the promotion of research on the environmental effects of acid precipitation; and the assessment of the financial costs of acid precipitation and the economic benefits of acid-precipitation control programs, weighed with other pollution-control programs and the national need for increased coal utilization. 81 references are cited as well as institutions active in acid rain research.

21749 **(PB—82-100074) National Emissions Report (1978): National Emissions Data Systems (NEDS) of the Aerometric and Emissions Reporting System (AEROS). Annual report.** (Environmental Protection Agency, Research Triangle Park, NC (USA). Monitoring and Data Analysis Div.). Dec 1980. 388p. NTIS, PC AMF A01.

The National Emissions Report summarizes annual cumulative estimates of source emissions of five criteria pollutants: particulates, sulfur oxides, nitrogen oxides, hydrocarbons, and carbon monoxide. Source emissions data are reported to the U. S. Environmental Protection Agency under provisions of Section 110 of the Clean Air Act, as amended 1977, and EPA Regulations, Title 40, Code of Federal Regulations, Part 51.321. Summary data are presented for the nation as a whole, for individual states, and for Air Quality Control Regions and individual interstate portions thereof. The data compilations result from the operations of the National Emissions Data System (NEDS), which functions as a component of the comprehensive EPA air information system--the Aerometric and Emissions Reporting System (AEROS). AEROS is managed by the National Air Data Branch, Monitoring and Data Analysis Division, Office of Air Quality Planning and Standards, U. S. Environmental Protection Agency at Research Triangle Park, North Carolina 27711.

21750 **(PB—82-106501) Air quality data - 1980 annual statistics including summaries with reference to standards. Annual report.** (Environmental Protection Agency, Research Triangle Park, NC (USA). Monitoring and Data Analysis Div.). Aug 1981. 468p. NTIS, PC AMF A01.

This report presents comprehensive summaries of data produced by the nation's ambient air quality monitoring activities for 1980. The data are summarized in two formats: frequency distribution (Part I) and status of data with reference to standards (Part II). These summaries are based on data acquired through extensive monitoring activities conducted by Federal, state, and local pollution control agencies and submitted to the U.S. Environmental Protection Agency's National Aerometric Data Bank. Information is provided on the six pollutants for which National Ambient Air Quality Standards have been set: total suspended particulates, carbon monoxide, sulfur dioxide, nitrogen dioxide, total hydrocarbons, lead, and ozone. Part II does not include a section for hydrocarbon data since the hydrocarbon standard was established as a guide for meeting the ozone standard and monitoring for hydrocarbons is not currently required.

21751 **(PB—82-106527) National emissions report (1979): National Emissions Data Systems (NEDS) of the Aerometric and Emissions Reporting System (AEROS). Annual report.** (Environmental Protection Agency, Research Triangle Park, NC (USA). Monitoring and Data Analysis Div.). Aug 1981. 1458p. NTIS, PC AMF A01.

The National Emissions Report summarizes annual cumulative estimates of source emissions of five criteria pollutants: particulates, sulfur oxides, nitrogen oxides, hydrocarbons, and carbon monoxide. Source emissions data are reported to the U. S. Environmental Protection Agency under provisions of Section 110 of the Clean Air Act, as amended 1977, and EPA Regulations, Title 40, Code of Federal Regulations, Part 51.321. Summary data are presented for the nation as a whole, for individual states, and for Air Quality Control Regions and individual interstate portions thereof. The data compilations result from the operations of the National Emissions Data System (NEDS), which functions as a component of the comprehensive EPA air information system--the Aerometric and Emissions Reporting System (AEROS). AEROS is managed by the National Air Data Branch, Monitoring and Data Analysis Division, Office of Air Quality Planning and Standards, U. S. Environmental Protection Agency at Research Triangle Park, North Carolina 27711.

21752 **(PB—82-217530) Techniques to determine a company's ability to conduct a quality stack test. Technical assistant document.** Mitchell, W.J.; Estes, E. (Research Triangle Inst., Research Triangle Park, NC (USA)). Mar 1982. 44p. NTIS, PC A03/MF A01.

Techniques to determine a testing company's ability to conduct a quality stack test for compliance or process engineering purposes are presented. The document has four sections. The first identifies characteristics commonly associated with laboratories that have a history of performing high quality stack tests. The second part suggests questions that can be asked of candidate companies during the selection process and presents process information that should be given to them so that they may be evaluated fairly. The third part presents techniques the evaluator can use at a company's laboratory during a pretest selection visit. The last part presents techniques that can be used during and after the actual test to determine the performance of the testing company and to estimate the quality of their test results.

21753 **(PB—82-219031) Methods for estimating wake flow and effluent dispersion near simple block-like buildings. Technical memo.** Hosker, R.P. Jr. (National Oceanic and Atmospheric Administration, Silver Spring, MD (USA). Air Resources Lab.). May 1981. 153p. (NOAA-TM-ERL-ARL—108). NTIS, PC A08/MF A01.

This report is intended as an interim guide for those who routinely face air quality problems associated with near-building exhaust stack placement and height, and the resulting concentration patterns. The report consolidates available data and methods for estimating wake flow and effluent dispersion near isolated block-like structures. The near-building and wake flows are described, and quantitative estimates for frontal eddy size, height and extent of roof and wake cavities, and far wake behavior are provided. Concentration calculation methods for upwind, near-building, and downwind pollutant sources are given. For an upwind source, it is possible to estimate the required stack height, and to place upper limits on the likely near-building concentration. The influences of near-building source location and characteristics relative to the building geometry and orientation are considered. Methods to estimate effective stack height, upper limits for concentration due to flush roof vents, and the effect of changes in rooftop stack height are summarized. Current wake and wake cavity models are presented. Numerous graphs of important expressions have been prepared to facilitate computations and quick estimates of flow patterns and concentration levels for specific simple buildings.

21754 **(PB—82-224643) Acid precipitation in the washington cascades: phase i. Report for 1 Oct 80-30 Sep 81.** Duncan, L.C. (Central Washington Univ., Ellensburg (USA)). Sep 1981. 25p. NTIS, PC A02/MF A01.

Precipitation falling on the Washington Cascades east and windward of the urban Puget Sound area is acidic with a volume average pH of 4.71 at the Cascade Crest (Snoqualmie Pass). Five sampling sites were maintained across the Cascades from January 1981 through July 1981. Twenty-nine watershed source lakes lying along the Cascade Crest 3-20 miles north of the precipitation collectors were sampled in the summer of 1981. Results of acidity tests are given.

21755 **(PB—82-225061) Atmospheric removal processes for toxic chemicals. Technical memo. report.** (National Oceanic and Atmospheric Administration, Silver Spring, MD (USA). Air Resources Lab.). Sep 1980. 41p. NTIS, PC A03/MF A01.

In order to assess the environmental impact of toxic chemicals in the United States, the Oak Ridge National Laboratory (ORNL) is developing a multimedia model to estimate the transport, diffusion, and removal of chemicals in the air-water-soil system. The Atmospheric Turbulence and Diffusion Laboratory (ATDL) was charged with assisting ORNL in the further refinement of the air transport and diffusion model and providing guidance on removal processes for toxic chemicals. This report is a review of the findings on removal processes. An overview is given of the general formulas and experiments regarding removal processes. Sections 3 and 4 contain specific removal methods for trace organic chemicals. Section 5 contains an application of the box model to simply account for all removal mechanisms discussed here. It soon became evident that there is disagreement among the experts regarding the quantitative estimation of removal of common pollutants, and nearly complete ignorance regarding specific organic chemicals.

21756 **(PB—82-226465) Combustion modification controls for stationary gas turbine. Volume I: environmental assessment. Final report Feb 78-Jun 80.** Larkin, R.; Lips, H.I.; Merrill, R.S.; Lim, K.J. (Acurex Corp., Mountain View, CA (USA). Energy and Environmental Div.). Jul 1981. 174p. NTIS, PC A08/MF A01.

The report gives an environmental assessment of combustion modification techniques for stationary gas turbines, with respect to NOx control effectiveness, operational impact, thermal efficiency impact, control costs, and effect on emissions of pollutants other than NOx.

21757 **(PB—82-226473) Combustion modification controls for stationary gas turbines. Volume II: Utility unit field test. Final report Jul 78-Jul 79.** Larkin, R.; Higginbotham, E.B. (Acurex Corp., Mountain View, CA (USA). Energy and Environmental Div.). Jul 1981. 158p. NTIS, PC A08/MF A01.

The report gives methods and results of an environmental assessment test program at Houston Lighting and Power's T.H. Wharton Generating Station, Unit 52. The aim of the program was to measure emissions changes resulting from applying NOx controls. Emissions of trace elements, organic materials, sulfur species, SO2, NOx, CO, and particulate matter were measured. These emissions, under normal and controlled (for NOx) operating conditions, were compared. Source operating data were also analyzed so that changes in operating parameters and efficiency could be assessed. Unit 52 is a General Electric MS 7001C simple-cycle, single-shaft, heavy duty gas turbine, rated at 70.8 MW nominal electrical output. This gas turbine may use either natural gas or distillate oil fuels. The test program was conducted using oil fuel. Water injection was used for NOx control.

21758 **(PB—82-227117) Evaluation of foams for mitigating air pollution from hazardous spills. Final report 29 Oct 76-31 Jul 80.** Gross, S.S.; Hiltz, R.H. (MSA Research Corp., Evans City, PA (USA)). Feb 1982. 85p. (MSAR—80-152). NTIS, PC A05/MF A01.

This program has been conducted to evaluate commercially available water base foams for mitigating the vapors from hazardous chemical spills. Foam systems were evaluated in the laboratory to define those foam properties which are important in mitigating hazardous vapors. Larger scale tests were then conducted in a 3 m x 3 m pan. Polar and nonpolar liquids and liquefied gases were used as test materials. Protein, fluoroprotein, alcohol and aqueous film forming foams were tested at low expansion ratios and surfactant foam agents at low, medium and high expansion ratios. The chemicals tested were acetone, n-butyl acetate, di-ethyl ether, n-octane, triethylamine, benzene, toluene, ethyl benzene, cyclohexane, propane, ethylene, butadiene, ammonia, chlorine, ethylene oxide, hydrogen fluoride and sulfur trioxide.

21759 **(PB—82-227695) Smog chamber experiments to test oxidant related control strategy issues. Final report 1978-81.** Kamens, R.M.; Jeffries, H.E.; Sexton, K.G.; Gerhardt, A.A. (North Carolina Univ., Chapel Hill (USA). Dept. of Environmental Sciences and Engineering). Mar 1982. 240p. NTIS, PC A11/MF A01.

Outdoor smog chamber experiments were performed to address various issues relating to ozone (O3) production and oxidant control strategies. Temperature effects on single hydrocarbon-NOx systems were studied. Propylene-NOx systems were modeled with particular attention to peroxynitric acid chemistry. Mechanisms were developed to model the O3 reactions with the two major isoprene daughter products, methylvinylketone and methacrolein. Chamber systems with isoprene and O3 were also modeled.

21760 **(PB—82-229360) Determination of effects of ambient conditions on aircraft engine emissions: data analysis and correction factor generation.** Donovan, P.J.; Fairchild, W.R.; Graves, K.W. (Calspan Corp., Buffalo, NY (USA)). Sep 1977. 194p. NTIS, PC A09/MF A01.

This report presents a set of correction factors for variations in turbine aircraft HC, CO, NOX and smoke emissions due to nonstandard day ambient temperature, pressure and humidity developed for the United States Environmental Protection Agency, Ann Arbor, Michigan. These correction factors are based on data from three EPA-sponsored full-scale engine tests, two EPA-sponsored combustor rig tests, and additional data solicited from industry sources. Key correlating parameters in this analysis were combustor inlet temperature, combustor inlet pressure, and ambient humidity. The correction factors have been developed using a multiple least squares regression analysis approach using functional emissions models based upon theoretical considerations and an extensive review of current ambient effects literature. Emphasis has been placed upon relating correction factor coefficients within a general engine class to various operating characteristics of each individual engine.

21761 **(PB—82-232067) Annual report 1974, U.S. Environmental Protection Agency, Office of Research and Development, Research Triangle Park, North Carolina.** (Environmental Protection Agency, Research Triangle Park, NC (USA)). 1974. 153p. NTIS, PC A08/MF A01.

This is the Annual report of the office of Research and Development at Research Triangle Park, EPA. The Office of Research and Development is a large research organization whose basic programs encompass air pollution, pesticides pollution, and radiation pollution. This summary provides a brief discussion of some of the major accomplishments of the research program during 1974 and indicates its future direction.

21762 **(PB—82-232448) Characterization of diesel emissions from operation of a light-duty diesel vehicle on alternate source diesel fuels.** Bykowski, B.B. (Southwest Research Inst., San Antonio, TX (USA)). Nov 1981. 74p. NTIS, PC A04/MF A01.

This report describes laboratory emissions evaluation of several alternate-source fuels in a 1980 Volkswagen Rabbit Diesel. Fuels tested included a No. 2 petroleum diesel as base, base plus coal-derived liquids, shale oil diesel fuel and jet fuel, and a blend of petroleum blend stocks with coal and shale liquids. Nine fuels were investigated in all, including the base fuel.

21763 **(PB—82-234147) Characterization of diesel emissions from operation of a light-duty diesel vehicle on alternate source diesel fuels. Final report Jun 80-Oct 81.** Bykowski, B.B. (Southwest Research Inst., San Antonio, TX (USA)). Nov 1981. 190p. NTIS, PC A09/MF A01.

Several alternate source diesel test fuels were studied to note their effects on regulated and unregulated exhaust emissions from a 1980 Volkswagen Rabbit. Nine fuel blends were tested, including a No. 2 petroleum diesel as base, base plus coal-derived liquids (via SRC-II and EDS processes), shale oil diesel and jet fuel, and other blends of coal-derived liquids, shale oil liquids, and petroleum stocks. Analyses performed include gaseous hydrocarbons, CO, NOx, particulate mass, phenols, smoke, odor, Ames tests, BaP, and polarity by HPLC. Smoke and particulate increases were generally associated with use of coal-derived liquids.

21764 **(PB—82-240714) Nitrogen oxides: an annotated bibliography.** (National Air Pollution Control Administration, Raleigh, NC (USA)). Aug 1970. 638p. NTIS, PC A99/MF A01.

This publication contains abstracts of a sample of the existing literature on the nitrogen oxides, 1959-1970 (with some earlier works). The full text of each abstract is contained in APTIC and the APTIC accession number is given. Oxides of nitrogen are important factors in air pollution since the complex chain reaction that produces smog is initiated by photolysis of nitrogen dioxide. In high concentrations, nitrogen oxides themselves may be toxic to humans and vegatation. There are occupational hazards associated with nitrous oxides, and the widespread persistence of nitrogen oxides from gasoline engine exhaust and from other community sources, have recently made it mandatory to know more about the biological effects and physical and chemical properties. (Author, Subject, and Geographic Location Index.)

21765 **(PB—82-240797) AEROS (Aerometric and Emissions Reporting System) information.** (Environmental Protection Agency, Research Triangle Park, NC (USA). Office of Air Quality Planning and Standards). 1974. 20p. NTIS, PC A02/MF A01.

The Aerometric and Emissions Reporting System (AEROS) is a comprehensive computer-based system established by the National Air Data Branch to collect, store and analyze air pollution data. The data are collected by the various state and local agencies and reported to EPA. These data are then stored and analyzed in AEROS. The most noteable feature of AEROS is that it is a reporting system. The primary function of AEROS is to provide concise and standardized reports on various aspects of air pollution. AEROS is composed of several subsystems, some of which are capable of functioning as independent data systems. The intent of this pamphlet is to show the relationships between the various AEROS subsystems and the information available from each.

21766 **(PB—82-241688) Evaluation of system variables in stage II refueling operations. Final report.** Piserchia, P.V. (Research Triangle Inst., Research Triangle Park, NC (USA)). 3 Jul 1975. 40p. NTIS, PC A03/MF A01.

This report covers the statistical analysis of the variables affecting hydrocarbon emissions during Stage II refueling operations for vapor balance recovery systems done by the staff of Research Triangle Institute, Research Triangle Park, NC. The purpose of the analysis was to assist the Environmental Protection Agency (EPA) in developing compliance test procedures for vapor balance recovery systems at service stations. In particular, the analysis was performed in order to determine the number of vehicles needed to establish a baseline curve for the system and to estimate and test, statistically, the significance of the estimated vapor emission rate.

21767 **(PB—82-242231) Air quality criteria for photochemical oxidants.** (National Air Pollution Control Administration, Washington, DC (USA)). Mar 1970. 206p. NTIS, PC A10/MF A01.

This document summarizes the current scientific knowledge of photochemical air pollution, and attempts to pick up the major deficiencies in that knowledge and the presently recognized needs for further research. This report focuses on photochemical oxidants as they are found in the ambient air. In general, discussions in the earlier chapters are oriented towards the physical and chemical nature of these oxidants, atmospheric concentrations and measurement of these oxidants, and possible natural sources of ozone. The presence of photochemical oxidants in the ambient air is then considered in later chapters in relation to (1) effects on vegetation, (2) effects on materials, (3) toxicological studies of effects on animals and man, and (4) epidemiological studies.

21768 **(PB—82-243288) Preliminary air pollution survey of hydrogen sulfide: a literature review.** Miner, S. (Litton Systems, Inc., Bethesda, MD (USA). Environmental Systems Div.). Oct 1969. 105p. NTIS, PC A06/MF A01.

This is a preliminary literature review representing present knowledge of hydrogen sulfide and its effects on humans, animals, plants and materials. Hydrogen sulfide is a colorless gas that has an obnoxious odor at low concentrations. The odor threshold is in the g/cu m range. In higher concentrations, the gas is toxic to humans and animals and corrosive to many metals. It will tarnish silver and react with heavy metals in points to discolor the paint. In humans, it will cause headache, conjunctivitis, sleeplessness, pain in the eyes, and similar symptoms at low air concentrations and death at high air concentrations. However, the majority of the complaints arising from hydrogen sulfide air pollution are due to its obnoxious odor in extremely low air concentrations. Air pollution by hydrogen sulfide is not a widespread urban problem but is generally localized in the vicinity of an emitter such as kraft paper mills, industrial waste disposal ponds, sewage plants, refineries, and coke oven plants.

21769 **(PB—82-244005) Guidance for the future use of NASN (This guideline replaces OAQPS number 1.2-020).** (Environmental Protection Agency, Research Triangle Park, NC (USA). Office of Air Quality Planning and Standards). Jun 1977. 10p. (OAQPS—1.2-075). NTIS, PC A02/MF A01.

This guidance is a replacement for OAQPS 1.2-020, 'Guidance for Decentralization and Continued Operation of the NASN,' September 1974. This material should clarify the integration of the NASN into the ambient monitoring program discussed in the draft Air Monitoring Strategy Document and should be used by Regions in their evaluation of state and local monitoring programs.

21770 **(PB—83-114736) 1976 national emissions report: national emissions data system of the aerometric and emissions reporting system (AEROS). Annual report.** (Environmental Protection Agency, Research Triangle Park, NC (USA). Monitoring and Data Analysis Div.). Aug 1979. 44p. NTIS, PC A03/MF A01.

The National Emissions Report summarizes annual cumulative estimates of source emissions of five criteria pollutants: particulates, sulfur oxides, nitrogen oxides, hydrocarbons, and carbon monoxide. Source emissions data are reported to the U.S. Environmental Protection Agency under provisions of Section 110 of the Clean Air Act, as amended 1977, and EPA Regulations, Title 40, Code of Federal Regulations, Part 51.321. Summary data are presented for the nation as a whole, for individual states, and for Air Quality Control Regions and individual interstate portions thereof. The data compilations result from the operations of the National Emissions Data System (NEDS), which functions as a component of the comprehensive EPA air information system--the Aerometric and Emissions Reporting System (AEROS). AEROS is managed by the National Air Data Branch, Monitoring and Data Analysis Division, Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, at Research Triangle Park, North Carolina 27711.

21771 **(PB—83-115600) National air pollutant emission estimates, 1970-1981. Final report.** (Environmental Protection Agency, Research Triangle Park, NC (USA). Monitoring and Data Analysis Div.). [nd]. 44p. NTIS, PC A03/MF A01.

This report presents estimates of trends in nationwide air pollutant emissions for the five major pollutants: sulfur oxides, particulates, carbon monoxide, volatile organic compounds, and nitrogen oxides. Estimates are broken down according to major types of air pollutant sources. A short analysis of emission trends is given, along with a discussion of methods used to develop the data.

21772 (PB—83-117911) Continuous rural ozone data collection in the northeast United States. (Environmental Research and Technology, Inc., Concord, MA (USA)). Nov 1980. 49p. NTIS, PC A03/MF A01.

This report presents rural ozone data collected in the Northeast United States during the summer period of July 1 to September 12, 1980. The monitoring was performed at four former Electric Power Research Institute-Sulfate Regional Experiment (EPRI-SURE) monitoring stations at Montague, MA; Scranton, PA; Indian River, DE; and Lewisburg, WV.

21773 (PB—285174) Simulation of nutrient loss from soils due to rainfall acidity. Reuss, J.O. (Environmental Protection Agency, Corvallis, OR (USA). Environmental Research Lab.). May 1978. 57p. (EPA—600/3-78-053). NTIS.

This paper describes a simulation model that provides a quantitative system utilizing established relationships from soil chemistry to predict the most-likely effect of rainfall acidity on the leaching of cations from noncalcareous soils. The model utilizes the relationships between lime potential (pH - 1/2 pCa) and base saturation described by Clark and Hill (Soil Sci. Soc. Amer. proc. 28:490-492, 1962) and Turner and Clark (Soil Sci. 99:194-199, 1964), the equilibrium between CO_2 partial pressure and H^+ and HCO_3^- in solution, the apparent solubility product of $AL(OH)_3$, the equilibrium of cations and anions in solution, the Freundlich isotherm description of sulfate adsorption, and mass balance considerations, to predict the distribution of ions between the solution and sorbed or exchangeable phases. Ionic composition of leachates in response to rainfall composition can thus be computed. Ions considered in the present version are H^+, Ca^{2+}, Al^{3+}, SO_4^{2-}, CL^-, and HCO_3^-. The model predicts almost exact chemical equivalence between basic cation removed in the leachate and strong-acid anions entering the system in the rainfall if pH - 1/2 pCa is above 3.0, at which point the base saturation will generally not exceed 20%. At lower pH - 1/2 pCa values leaching of anions in association with H^+ and Al^{3+} becomes significant and these cations predominate when pH - 1/2 pCa falls below 2.0.

21774 (PNL—4599) MAP3S Precipitation Chemistry Network: fifth periodic summary report (1981). Dana, M.T.; Rothert, J.E. (Pacific Northwest Lab., Richland, WA (USA)). Feb 1983. Contract AC06-76RL01830. 252p. NTIS (US Sales Only). Order Number DE83007992.

This, the fifth in a series of summary reports, contains complete field and chemical data from the MAP3 Precipitation Chemistry Network for the year 1981. The 1981 data were added to the previous data base, and an update of the previous five year statistical summary completed. Included are basic statistics, time trend analyses, and monthly averages.

21775 (PNL-SA—10480) Potpourri of deposition and resuspension questions. Slinn, W.G.N. (Pacific Northwest Lab., Richland, WA (USA)). Jan 1983. Contract AC06-76RL01830. 57p. (CONF-821136—19). NTIS, PC A04/MF A01. Order Number DE83007076.

From 4. international conference on precipitation scavenging, dry deposition and resuspension; Santa Monica, CA, USA (29 Nov 1982).

Twenty questions and answers are listed dealing with particulate deposition, resuspension, and precipitation scavenging.

21776 (PNL-SA—10481) Inland transport, mixing, and deposition of sea-salt particles. Slinn, W.G.N. (Pacific Northwest Lab., Richland, WA (USA); Washington Univ., Seattle (USA). Dept. of Atmospheric Sciences; Oregon State Univ., Corvallis (USA). Dept. of Atmospheric Science). Jan 1983. Contract AC06-76RL01830. 11p. (CONF-821136—20). NTIS, PC A02/MF A01. Order Number DE83007082.

From 4. international conference on precipitation scavenging, dry deposition and resuspension; Santa Monica, CA, USA (29 Nov 1982).

The objective was to deduce dry deposition velocities for submicron particles of sea-salt depositing on forests. Aircraft measurements were made on particles with diameters as small as 0.1 μm. This report describes the experimental design, results from three flights, interpretations, and suggestions for future research. (ACR)

21777 (SP-RAPP—1979:22-PT-1) Evaluation of filter-tape analyzing devices, part 1. Aakesson, E. (Statens Provningsanstalt, Boraes (Sweden)). 1979. 25p. (In several languages). NTIS, PC A02/MF A01.

Analyzers are discussed that are available for: toluenediisocyanate, methylenediisocyanate, organic isocyanates, H_2S, phosgene, dinitrotoluene, HCl, Cl, SO_2, NH_3, NO_2, vinyl chloride, hydrazine and toluenediamine. Filter-tape devices exist both in the transportable and in the portable form. Portable environmental measuring devices are now on the market for toluene-diisocyanate, phosgene and hydrazine.

21778 (SP-RAPP—1980:11-PT-2) Evaluation of filter-tape analyzing devices, part 2. Aakesson, E.; Stridh, G.; Lundgren, B. (Statens Provningsanstalt, Boraes (Sweden)). 1980. 24p. (In Slovene). NTIS, PC A02/MF A01.

The use of the devices in places of work is surveyed. In Sweden, almost the only use of these devices is the recording of the toluene diisocyanate (TDI) content in the air, as a control in the handling of TDI in polyurethane foam manufacturing. Generally the users are satisfied with these analyzers. Data and application fields are reported for stationary and portable devices.

21779 Nonideal collection characteristics of a cascade impactor with various collection substrates. Barr, E.B.; Newton, G.J.; Yeh, H.C. (Lovelace Biomedical and Environmental Research Inst., Inc., Albuquerque, NM). *Environmental Science and Technology;* **16**: No. 9, 633-635(Sep 1982). Contract AC04-76EV01013.

A series of collection substrates was used to evaluate the dependence of collection efficiency on substrate type on one stage of a seven-stage cascade impactor. Data obtained were used to determine which substrates yielded the best collection characteristics for cascade impactors. Stainless steel, silver membrane filters, and cellulose acetate membrane filters as cascade impactor collection substrates showed stage collection characteristics that closely fit theoretical predictions. Fiber-type substrates showed the most deviation from the theoretical efficiency curve.

21780 The use of principal component factor analysis to interpret particulate compositional data sets. Roscoe, B.A. (Univ. of Illinois, Urbana); Hopke, P.K.; Dattner, S.L.; Jenks, J.M. *Journal of the Air Pollution Control Association;* **32**: No. 6, 637-642(Jun 1982). Contract AC02-80EV10403.

The study of urban aerosols often yields large data bases consisting of elemental and meteorological data for a multitude of samples collected at various locations and times. Several statistical techniques are currently being used to identify the nature of aerosol sources using these data. However, errors present in the data base may make the interpretation difficult. In addition to its value as a receptor model, principal component factor analysis has the ability to identify the errors present in the data so that appropriate corrections may be made before detailed data interpretation is attempted. Thus the technique can save much time and effort. Principal component factor analysis can yield interpretations of aerosol data and a better understanding of the airshed being studied.

21781 Statistical analysis of nephelometer regional field data. Babson, B.L. (Systems Applications, Inc., San Rafael, CA); Bergstrom, R.W.; Samuelson, M.A.; Seigneur, C.; Waggoner, A.; Malm, W.C. *Atmospheric Environment;* **16**: No. 10, 2335-2346(1982).

Visual air quality can be specified in terms of the visual range calculated from a point measurement of the particle scattering coefficient. This paper investigates the difference between point and spatially averaged scattering coefficient in terms of its impact on calculated visual range and plume-horizon contrast. Nephelometer measurements taken simultaneously at three different locations during a three-week period from 28 June to 13 July 1979 were investigated to determine their spatial variability. The investigation showed three distinct types of atmospheric conditions that could be characterized both by nephelometer data and by the origin of the ambient air: a regional-haze period, which corresponded to a fairly homogeneous atmosphere; a forest-fire period, which corresponded to a rather inhomogeneous atmosphere and a clear-background period. The standard deviations were used to estimate the corresponding uncertainties in visual range calculations and to estimate the sensitivity of plume visibility model predictions to these uncertainties. Relative deviations in plume contrasts were calculated for four typical case studies. The deviations ranged from 1 to 43 per cent for absolute contrast values above 0.02, depending on plume-observer distance, wavelength and the original visual range value.

21782 **Physical, chemical and optical characteristics of a clean air mass over northern Michigan.** Alkezweeny, A.J.; Laulaninen, N.S.; Thorp, J.M. (Batelle Pacific Northwest Lab., Richland, WA). *Atmospheric Environment;* **16**: No. 10, 2421-2430(1982). Contract AC06-76RL01830.

Characterization of a clean air mass over and near Seney National Wildlife Refuge was undertaken during June 1979. The study which provides baseline information relative to the prevention of significant deterioration in national parks and wilderness areas, consisted of aircraft measurements of aerosol size distributions, aerosol elemental and chemical composition, aerosol light scattering and light absorption coefficients and trace gas concentrations, including ozone and sulfur dioxide. The aerosol light absorption coefficients in this clean air mass were essentially zero, implying a negligible amount of elemental carbon aerosol. Ozone concentrations were variable between 40 and 60 ppbv. The range of SO_2 concentrations was 0.3-2.0 ppbv with an average value of about 0.6 ppbv; these values are also similar to background concentrations found elsewhere in clean continental air. Trace element concentrations were comparable with those found in other clean areas and indicated a significant crustal component. Enhanced levels of Pb and Br suggest automotive exhaust from local activity possibly contributed to background aerosol levels. The clean air measurements were also compared to measurements made on the same day in a nearby slash-burn smoke plume.

21783 **Street level versus rooftop sampling: carbon monoxide and aerosol in New York City.** Bauman, S.E. (City Univ. of New York, Brooklyn); Williams, E.T.; Finston, H.L.; Ferrand, E.F.; Sontowski, J. *Atmospheric Environment;* **16**: No. 10, 2489-2496(1982). Contract AC02-76ER03126.

Aerosol samples were simultaneously collected with three cascade impactors for 2-h periods; two of the impactors were located at street level and the third was located on the 16th floor, all on the same city block in Manhattan. Carbon monoxide was also measured at all three sites. Particle-size distributions of the respective elements were similar, in contrast with the concentrations, which were not. The concentrations at street level, e.g., lead and CO, decreased with height as expected. On the other hand, the concentrations of particulate sulfur did not diminish with height. The results obtained from the two cascade impactors and CO monitors located around the corner from each other at street level show significantly different pollutant concentrations, thereby indicating the difficulty in obtaining representative samples at street level.

21784 **Relative importance of atmospheric sulfates and nitrates in visibility reduction.** Tang, I.N. (Brookhaven National Lab., Upton, NY). *Atmospheric Environment;* **16**: No. 11, 2753(1982).

We wish to report a computational error in our recent paper published in Atmospheric Environment 15, 2463 (1981; I.N. Tang, W.T. Wong, and H.R. Munkelwitz). In comparing the extinction coefficients between the external and internal mixtures for mixed sulfate-nitrate aerosols, we stated in the paper that the basis of computation used was 1 $\mu g\ m^{-3}$ of dry salt content for all cases. As it turned out, we had used by mistake 1 $\mu g\ m^{-3}$ of the aqueous salt solution at the deliquescence point in the calculation for the internal mixtures. Since the salt content of the aerosol as internal mixture was inadvertently made less than that of the corresponding aerosol as external mixture, the comparison as presented in Figures 9 and 10 of the original paper is no longer meaningful. We have subsequently recomputed the extinction coefficients for the internal mixtures on the originally stated basis of 1 $\mu g\ m^{-3}$ of dry salt content. As before, the extinction coefficient curves calculated for the four different aerosol size distributions of each internal mixture tend to group together. It seems now that the internal mixture shows a better agreement with the statistical correlation of Cass than does the external mixture. For practical purposes, however, the difference in visibility reduction by sulfate-nitrate aerosols of either type of mixtures is indeed very small, especially at relative humidities below 60% when all aerosol particles are in the crystalline state or about 80% when they all have become homogeneous solution droplets.

21785 **Determination of condensation nuclei using a modified Aitken method.** Kubie, G.; Schless, D. pp vp of Aerosols in science medicine and technology. Stoeber, W.; Hochrainer, D. (eds.). Bad Soden, Germany; Gesellschaft fuer Aerosolforschung e.V. (1981). (In German)

From Conference on aerosols in science and technology - aerosols in and from in and from industrial processes; Duisburg, F.R. Germany (23 Sep 1981).

A test set-up for ultra-microscopic detection of condensation nuclei according to the Aitken-method is described, and it is shown that due to the delay of a video camera tube the video-technique allows to store flashlight shots of condensation particles such as they occur in an expansion cloud chamber. The possibilities resulting from that technique are stated.

21786 **Analysis of continuous flow condensation nuclei counters.** Metayer, Y.; Perrin, M.L.; Madelaine, G. pp vp of Aerosols in science medicine and technology. Stoeber, W.; Hochrainer, D. (eds.). Bad Soden, Germany; Gesellschaft fuer Aerosolforschung e.V. (1981).

From Conference on aerosols in science and technology - aerosols in and from in and from industrial processes; Duisburg, F.R. Germany (23 Sep 1981).

Calculations and experimental results exhibit a good agreement. Thus the model developed seems to give an accurate description of the phenomena occuring in the Continuous Flow CNC's. For concentrations larger than 10^4 $p.cm^{-3}$, the final droplets size decreases and a significant vapor's reduction occurs. This result explains the irregular shape of the factory calibration curve for the large concentrations range. Furthermore, for a concentrated polydisperse aerosol, a dilution technique must be used for meaningful measurements.

21787 **Natural ion concentration in air as an indication of atmosphere pollution by nanometer aerosol particle.** Drozdowicz, B.; Niziol, B.; Wandzilak, P.; Wcislak, L.; Jura, Z. pp vp of Aerosols in science, medicine and technology. Stoeber, W.; Hochrainer, D. (eds.). Bad Soden, Germany; Gesellschaft fuer Aerosolforschung e.V. (1981).

From Conference on aerosols in science and technology - aerosols in and from in and from industrial processes; Duisburg, F.R. Germany (23 Sep 1981).

The relation between natural ion concentration in air and atmosphere pollution by ultrafine aerosol particles has been shown. The notion 'ion' in this paper applies to charged atoms and molecules of gaseous air component and charged aerosol particles present in air. On the ground of electrical mobility value a classification of ions present in atmospheric air has been carried out.

21788 **New approach to the determination of atmospheric strong acids.** Niessner, R.; Klockow, D. pp vp of Aerosols in science, medicine and technology. Stoeber, W.; Hochrainer, D. (eds.). Bad Soden, Germany; Gesellschaft fuer Aerosolforschung e.V. (1981).

From Conference on aerosols in science and technology - aerosols in and from in and from industrial processes; Duisburg, F.R. Germany (23 Sep 1981).

21789 **Time sequential sampling and elemental analysis of indoor and outdoor aerosol.** Jupe, H.; Richter, F.W.; Waetjen, U. pp vp of Aerosols in science, medicine and technology. Stoeber, W.; Hochrainer, D. (eds.). Bad Soden, Germany; Gesellschaft fuer Aerosolforschung e.V. (1981).

From Conference on aerosols in science and technology - aerosols in and from in and from industrial processes; Duisburg, F.R. Germany (23 Sep 1981).

The paper deals with aerosol sampling by a so called 'streaker', elemental analysis by proton induced X-ray emission, comparison of streaker data with high volume data and gives finally an application to urban aerosol investigation.

21790 **Investigation to the separation efficiency of a cyclone seporator using a stray light particle size counting technique.** Mothes, H.; Loeffler, F. pp vp of Aerosols in science, medicine and technology. Stoeber, W.; Hochrainer, D. (eds.). Bad Soden, Germany; Gesellschaft fuer Aerosolforschung e.V. (1981). (In German)

From Conference on aerosols in science and technology - aerosols in and from in and from industrial processes; Duisburg, F.R. Germany (23 Sep 1981).

As part of this work separation efficiency curves and low particle concentrations and particle size distributions in the cyclone separation room were experimentally established on a test cyclone by means of a stray light particle size counting technique. To this effect sampling probes were used to take samples of the dust-loaded gas in the inlet, outlet and separation room of the cyclone partial flows by isokinetic sampling, for which the particle concentration and particle size distribution were obtained with a stray light measuring technique. It was shown that with the stray light measuring device separation efficiency curves can be detected rapidly and with a high sensitivity. During the measurements the cyclone geometry as well as the throughput and the crude gas dust concentration were subject to variations. New perceptions were gained especially concerning the influence of the dust concentration upon the separation efficiency. In addition the experimental results provide valuable hints for the theoretical models; they prove for example that the deterministic model assumption correctly describes the local distribution of the particle sizes in the separation room.

21791 **Measurement procedure for acquisition of spatial imhomogeneous aerosol concentrations.** Willms, I. pp vp of Aerosols in science, medicine and technology. Stoeber, W.; Hochrainer, D. (eds.). Bad Soden, Germany; Gesellschaft fuer Aerosolforschung e.V. (1981).

From Conference on aerosols in science and technology - aerosols in and from in and from industrial processes; Duisburg, F.R. Germany (23 Sep 1981).

For the acquisition of spatial inhomogeneous distributed aerosols a method has been developed, which is based on the evaluation of a set of optical extinction measurements. The evaluation is accomplished by a modified computer tomographical method. This method is relatively insensible to errors in the input data. Thus even with measurement data gained by means of a simply constructed model of the measurement apparatus evaluable results can be obtained.

21792 **Aerosol measurement by photon correlation spectroscopy.** Itoh, M.; Takahashi, K. pp vp of Aerosols in science, medicine and technology. Stoeber, W.; Hochrainer, D. (eds.). Bad Soden, Germany; Gesellschaft fuer Aerosolforschung e.V. (1981).

From Conference on aerosols in science and technology - aerosols in and from in and from industrial processes; Duisburg, F.R. Germany (23 Sep 1981).

21793 **Structure and bonding of transition metal-sulfur dioxide complexes.** Ryan, R.R.; Kubas, G.J.; Moody, D.C.; Eller, P.G. (Los Alamos National Lab., NM). *Structure and Bonding (Berlin);* **46**: 47-100(1981).

This review has attempted to summarize presently known information on the structure and bonding of transition metal-SO_2 complexes. The relationship between M-SO_2 bonding type and the pertinent metal orbital template has been illustrated and, where appropriate, inferences have been made with respect to SO_2 reactivity. In addition the unique utility of SO_2 as a bonding probe for transition metal species has been discussed. It is evident that SO_2 is unmatched among small molecule ligands in the variety of coordination modes it exhibits in transition metal complexes. Emerging chemistry of M-SO_2 species demonstrates the feasibility of novel reaction chemistry, reversible binding, and perhaps even useful catalytic systems having interesting academic as well as practical significance. New types of SO_2 binding and reactivity are anticipated with further study. 210 references.

5003 Radioactive Materials Monitoring And Transport

REFER ALSO TO CITATION(S) 19804, 19829, 19881, 19890, 19893, 20629, 21832, 21840, 21871, 21891, 21990

21794 **(AD-A—115514/2) A two step method to treat variable winds in fallout smearing codes. Master's thesis.** Hopkins, A.T. (Air Force Inst. of Tech., Wright-Patterson AFB, OH (USA). School of Engineering). Mar 1982. 136p. (AFIT/GNE/PH—82M-10). NTIS, PC A07/MF A01.

A method was developed to treat non-constant winds in fallout smearing codes. The method consists of two steps: (1) location of the curved hotline (2) determination of the off-hotline activity. To locate the curved hotline, the method begins with an initial cloud of 20 discretely-sized pancake clouds, located at altitudes determined by weapon yield. Next, the particles are tracked through a 300 layer atmosphere, translating with different winds in each layer. The connection of the 20 particles' impact points is the fallout hotline. The hotline location was found to be independent of the assumed particle size distribution in the stabilized cloud. The off-hotline activity distribution is represented as a two-dimensional gaussian function, centered on the curved hotline. Hotline locator model results were compared to numerical calculations of hypothetical 100 kt burst and to the actual hotline produced by the Castle-Bravo 15 Mt nuclear test.

21795 **(ANL/NESC—47) CLOUD; gamma-ray dose rate from a cloud.** Cooper, R.E. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048047.

The CLOUD program calculates the external gamma-ray dose rate and total integrated dose resulting from the continuous release of radioactive materials to the atmosphere.IBM360; FORTRAN IV; 32K memory.

21796 **(EGG—1183-1835) Aerial radiological survey of the Callaway Plant and surrounding area, Fulton, Missouri.** (EG and G, Inc., Las Vegas, NV (USA). Energy Measurements Group). Dec 1982. Contract AC08-76NV01183. 12p. NTIS, PC A02/MF A01. Order Number DE83007884.

An aerial gamma survey was conducted over the Callaway Plant and the surrounding area in April 1982. The survey included the plant water intake and discharge location on the Missouri River. Separate ground-based ion chamber measurements and soil samples were collected in the survey area to support the aerial data. Gamma data, stored on magnetic tape, were searched for evidence of man-made gamma emitters. A contour map of the terrestral exposure rate plus the cosmic exposure rate at 1 meter was prepared and overlaid on a photograph and a USGS topographic map of the area. The exposure contour map is typical for farmland in the mid-western United States. Terrestrial plus cosmic exposure rates ranged from 4 microroentgens per hour (μR/h) over the Missouri River to a maximum of 12 μR/h over the cultivated land. A ^{137}Cs calibration source was detected at the Callaway Plant site.

21797 **(EML—412, pp II.5-II.82) Quarterly ^{90}Sr deposition at world land sites.** Larsen, R. 1 Nov 1982. NTIS, PC A13/MF A01.

In Environmental Measurements Laboratory. Environmental report, March 1-September 1, 1982.

The results of quarterly ^{90}Sr data at 75 sites beginning in 1976 through 1981 are reported. Of the 75 sites for which quarterly data are reported, the monthly collections at 67 sites are composited and analyzed quarterly starting with the July 1976 samples. Calculated values of concentrations of ^{90}Sr in precipitation are given in units of pCi of ^{90}Sr per liter. The precipitation in centimeters and the ^{90}Sr deposition in millicuries per square kilometer is given for each quarter where data are available.

21798 (EML—412, pp II.83-II.183) **Project airstream: radioactivity in the lower stratosphere.** Leifer, R.; Larsen, R. (Environmental Measurements Lab., New York, NY). 1 Nov 1982. NTIS, PC A13/MF A01.

In Environmental Measurements Laboratory. Environmental report, March 1-September 1, 1982.

Project Airstream is a study of radioactiviy and nonnuclear compounds in the lower stratosphere employing the WB-57F aircraft as a sampling platform. Radioactivity data are reported for the missions flown in July 1980, October 1980, July 1981, October 1981 and April 1982. Gamma measurements were made on Be-7, Zr-95, Cs-137, and Ce-144. Radiochemical analyses are reported for Sr-90, Pu-239, 240, and Pb-210. (JGB)

21799 (ENICO—1116-Suppl.1(11-82)) **ICPP effluent monitoring report, November 1982.** Guinn, L.A. (Exxon Nuclear Idaho Co., Inc., Idaho Falls (USA)). Jan 1983. Contract AC07-79ID01675. 53p. NTIS, PC A04/MF A01. Order Number DE83007919.

Covers reporting period, October 20, 1982 through November 19, 1982. There have been no significant or unplanned releases to date in CY-1982. A summary of the total airborne, liquid and solid releases to date for CY-1982 are graphed. The airborne activity forecast is based on the assumption that the electrolytic dissolution would run for approximately 15 days during the first quarter; however, this did not occur. Both radioactive and chemical effluents are included.

21800 (INIS-mf—7499, pp v) **Radioactivity of fly ash from power plants in North Bohemian and East Bohemian Regions.** Vlcek, J. (Krajska Hygienicka Stanice, Hradec Kralove (Czechoslovakia)); Martinec, M. (Krajska Hygienicka Stanice, Usti nad Labem (Czechoslovakia)); Husak, V. (Fakultni Nemocnice, Olomouc (Czechoslovakia). Oddeleni Nuklearni Mediciny). 1980. (In Czech). .

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

Published in summary form only.

21801 (N—82-18268) **Radiation environment mapping.** Benton, E.Y. (San Francisco Univ., CA (USA)). Nov 1981. 3p. NTIS, PC A08/MF A01.

In NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions 3 p (SEE N82-18234 09-12).

An experimental set up to map the cosmic radiation field inside the Spacelab vehicle to determine the potential biological hazards present is described. In addition to the integral linear energy transfer (LET) spectrum for protons and HZE particles, the parameters to be determined include the total radiation dose, fluence of neutrons, protons, and high charge and energy (HZE) particles. These results are to be derived from measurements made in passive dosimeters.

21802 (NUREG/CR—2584) **Meteorological considerations in the development of a real-time atmospheric dispersion model for reactor effluent exposure pathway.** Van der Hoven, I. (National Oceanic and Atmospheric Administration, Silver Spring, MD (USA). Air Resources Lab.). May 1982. 23p. NTIS, PC A02/MF A01.

Meteorological considerations, as part of an overall emergency plan in the event of an inadvertent atmospheric release of radioactive effluents from a nuclear reactor, are discussed in terms of the site meteorological measurement capability, the atmospheric transport and diffusion prediction requirements, the source term configuration, and the requirements posed by special site characteristics such as coastal, valley, and mountainous locations.

21803 (NUREG/CR—2637) **Emergency response capabilities and example assessments for airborne radionuclide discharges.** Start, G.E.; Cate, J.H.; Ackermann, G.R.; Dickson, C.R. (National Oceanic and Atmospheric Administration, Idaho Falls, ID (USA). Air Resources Lab.). May 1982. 38p. NTIS, PC A03/MF A01.

An existing emergency response capability has been developed for the Idaho National Engineering Laboratory by the National Oceanic and Atmospheric Administration Air Resources Laboratories Field Research Office. The system consists of several existing computers and associated data collection facilities. This equipment has been coordinated into a useful capability providing initial and ongoing analysis of meteorological and radiological information. In the event of a radiological emergency, this information may be used to assist action plan formulations and decisions for the area in and around the Snake River Plain in Southeast Idaho.

21804 (PB—83-114702) **^{237}U nelle ricadute atmosferiche): Ispra 1980 (^{237}U in atmospheric fall-out): Ispra 1980).** Dominici, G.; Malvicini, A. (Commission of the European Communities, Ispra (Italy)). [nd]. 20p. NTIS PC E03/MF E03.

The presence of ^{237}U, due to a nuclear test performed on October 16th, 1980 by the Chinese Peoples' Republic has been detected in air by gamma spectrometry. Concentration data for the period October 1980 - February 1981 for ^{237}U and the other radionuclides normally present in the fall-out after an atmospheric nuclear test are reported.

21805 (Y/DD—318) **Reduction in airborne contamination levels at the 9201-5 Arc Melt sawing operation. A Y-12 Plant 1982 ALARA goal.** Beck, D.E.; West, C.M. (Oak Ridge Y-12 Plant, TN (USA)). Feb 1983. Contract W-7405-ENG-26. 27p. NTIS, PC A03/MF A01. Order Number DE83008707.

Lowering the uranium airborne contamination level at the two saws in the 9201-5 Arc Melt Area was chosen as a Y-12 Plant As-Low-As-Reasonably-Achievable (ALARA) goal for 1982. This priority was convincingly communicated to those involving by giving specific instructions to suspend saw operations any time there was evidence of a problem until that problem could be corrected. Using control charts on air flow rates into the saw enclosures and pressure drops across filters in the saw ventilation (Delta Phase I) exhaust system, it was possible to decide when filter changes or other adjustments were necessary to maintain the exhaust flow rates needed for improved airborne contamination control. The keeping of these charts, along with the actions taken on the basis of the data gathered, made it possible to meet the goal of reducing airborne contamination levels in 1982, as compared with 1981, although production in the Arc Melt Area increased significantly. These data also showed that use of one brand of filter in the prefilter system resulted in the need to change filters more frequently than when another brand was used. This fact triggered an investigation which revealed the cause for the shorter useful life of that filter and a request that only specifically approved filters be purchased for use in this system. Use of these control data also made it possible to establish that the exhaust system operated more effectively without the Roto-clone hydrostatic pecipitators because exhaust air flow was increased without reduction in filter life.

21806 (NUREG—0837-V1-N3-N4) **NRC TLD (thermoluminescent dosimeter) direct radiation monitoring network. Technical progress report Jul-Dec 81.** Costello, F.; Thompson, T.; Cohen, L. (Nuclear Regulatory Commission, Washington, DC (USA)). May 1982. 178p. NTIS, PC A09/MF A01.

This report provides the status and results of the NRC Thermoluminescent Dosimeter (TLD) Direct Radiation Monitoring Network. It presents the radiation levels measured in the vicinity of NRC-licensed facility sites throughout the country for the second half of 1981.

21807 **Mica nuclear track filters.** Tress, G.; Khan, E.U.; Vater, P.; Werner, W.; Brandt, R.; Kadner, M.; Spohr, R. pp vp of Aerosols in science, medicine and technology. Stoeber, W.; Hochrainer, D. (eds.). Bad Soden, Germany; Gesellschaft fuer Aerosolforschung e.V. (1981).

From Conference on aerosols in science and technology - aerosols in and from in and from industrial processes; Duisburg, F.R. Germany (23 Sep 1981).

Mica nuclear track filters are produced by irradiation of mica with energetic heavy ions and subsequent etching. The properties of these filters and the air through-put up to 300°C are reviewed. At an industrial plant mica filters are used to filter < 350°C hot waste gas containing radioactive aerosols from the production of reactor fuel elements. After filtration the aerosol particles on the filters are examined by different methods for their properties.

21808 **Emission and ambient concentrations of longliving aerosol radionuclides at stade nuclear power plant.** Hollaender, W.; Mause, P.; Morawietz, G.; Pape, E.; Pohlmann, G. pp vp of Aerosols in science, medicine and technology. Stoeber, W.; Hochrainer, D. (eds.). Bad Soden, Germany; Gesellschaft fuer Aerosolforschung e.V. (1981).

From Conference on aerosols in science and technology - aerosols in and from in and from industrial processes; Duisburg, F.R. Germany (23 Sep 1981).

21809 **Aerosols in nuclear engineering.** Schikarski, W.O. pp vp of Aerosols in science, medicine and technology. Stoeber, W.; Hochrainer, D. (eds.). Bad Soden, Germany; Gesellschaft fuer Aerosolforschung e.V. (1981). (In German)

From Conference on aerosols in science and technology - aerosols in and from in and from industrial processes; Duisburg, F.R. Germany (23 Sep 1981).

Nuclear aerosols represent a three-phase, dynamic system of solid particles, droplets and gaseous compounds in a carrier gas, which rapidly changes its properties due to aerosol processes, external forces and geometric boundary conditions. Computer programs for description of the aerosol system have been developed showing sufficient agreement with experiments. Open questions concern the aerosol formation, form factors, certain aerosol processes as well as the aerosol chemistry. Due to the particular properties of nuclear aerosols it is necessary to develop chemically resistant and heat-proof separators (e.g. sand bed filters).

21810 **Characterization of nuclear fuel aerosol by sedimentation.** Pickering, S. pp vp of Aerosols in science, medicine and technology. Stoeber, W.; Hochrainer, D. (eds.). Bad Soden, Germany; Gesellschaft fuer Aerosolforschung e.V. (1981).

From Conference on aerosols in science and technology - aerosols in and from in and from industrial processes; Duisburg, F.R. Germany (23 Sep 1981).

The results obtained with the sedimentation counter showed that both the material composition and the porosity of nuclear fuel pellets were important parameters on which both the amount of aerosol and the variation of MMAD under different generating conditions depended. This work will be continued with the aim of relating these dependences to specific mechanical properties of the materials.

21811 **Studying a hot particle with radiological methods.** Maschek, I.; Csepregi, T. pp vp of Aerosols in science, medicine and technology. Stoeber, W.; Hochrainer, D. (eds.). Bad Soden, Germany; Gesellschaft fuer Aerosolforschung e.V. (1981).

From Conference on aerosols in science and technology - aerosols in and from in and from industrial processes; Duisburg, F.R. Germany (23 Sep 1981).

Discussion was reported on the investigation of environmental single hot particle captured onto aerosol filter. Fission nuclides identified by gamma spectrometric analysis provided the time of origin of particle, which corresponded to the date of a recent atmospheric nuclear test of 16 October, 1980. The sole presence of hot particle on the filter was registered with autoradiographs. In addition, by means of Energy Dispersive X-ray Microanalysis the particle size could be measured about micrometer. The applied methods are adequate to make a distinction on radioaerosols released by nuclear reactor and originated from an explosion.

21812 **Resuspension of cerium-IV-oxide powder aggregates and measurement of their mass distribution.** Seehars, D.; Hochrainer, D. pp vp of Aerosols in science, medicine and technology. Stoeber, W.; Hochrainer, D. (eds.). Bad Soden, Germany; Gesellschaft fuer Aerosolforschung e.V. (1981). (In German)

From Conference on aerosols in science and technology - aerosols in and from in and from industrial processes; Duisburg, F.R. Germany (23 Sep 1981).

Expansion and release experiments with radioactive materials such as PuO_2-powder in order to evaluate the potential environmental exposure due to accidental release, i.e. by fire, are impossible for safety reasons. Such experiments can therefore only be performed by means of an inert model powder. This report deals with the experience gained with the model powder CeO_2. There are the two following reasons for choosing CeO_2: This compound is of high thermal stability, it is one of those oxides that melt at high temperatures; and Ce has a certain 'chemical resemblance' with plutonium, both metals form similar compounds with a number of elements.

5004 Thermal Effluents Monitoring And Transport

21813 **(ORNL/TM—8603) Meteorological effects of thermal energy releases (METER) program. Progress report, October 1980-September 1982.** Patrinos, A.A.N.; Hoffman, H.W. (comps.). (Oak Ridge National Lab., TN (USA)). Mar 1983. Contract W-7405-ENG-26. 98p. NTIS, PC A04/MF A01. Order Number DE83008313.

This report examines the inadvertent weather modification effects of large cooling towers and cooling ponds. Emphasis was placed on field studies, and the focus of the program was on a precipitation modification study around the Bowen Electric Generating Plant in northwestern Georgia. The field effort includes the study of wetfall chemistry in the plant's vicinity. The analysis of three years of precipitation data have failed to show a significant effect of the plant on rainfall volume; the investigation of rainfall pattern variability has been inconclusive. The studies of wetfall chemistry have provided valuable information on the mechanisms of plume washout from large point sources and on the general characteristics of precipitation chemistry in the southeastern US.

21814 **(SFB—80/E/214) Experimental investigation of cooling tower plumes. Pt. 1.** Andreopoulos, J. (Karlsruhe Univ. (T.H.) (Germany, F.R.). Sonderforschungsbereich Ausbreitungs- und Transportvorgaenge in Stroemungen). Jun 1982. 41p. Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe (Germany, F.R.).

Extensive measurements were made of the velocity field of a non-buoyant plume issuing from a cylindrical pipe perpendicularly into a uniform cross stream. A home-made subminiature triple hot-wire probe has been used in the measurements which include the three mean velocity components, all the Reynolds stresses as well as the triple products occuring in the Reynolds stress transport equations. The cross flow causes the plume to bend towards the downstream direction and produces behind the cylinder a strongly turbulent wake which in turn interacts with the plume. This interaction, together with the extra rates of strain due to streamline curvature and lateral convergence/divergence makes the flow very complicated. The turbulence level in the wake is much higher than in the plume and reaches a maximum four diameters downstream before it starts to decay. At ten diameters downstream the longitudinal mean velocity profile is monotonic while turbulence diffusion is negligible.

5005 Site Resource And Use Studies

REFER ALSO TO CITATION(S) 19859, 19860

5006 Regulations

REFER ALSO TO CITATION(S) 22005

21815 (CONF-820970—, pp I.9-I.15) **Carbon dioxide, science and consensus: a congressional staff point of view.** Greene, J.C. (Committee on Science and Technology, Washington, DC). Feb 1983. NTIS, PC A23/MF A01.

From Carbon dioxide research conference: carbon dioxide, science and consensus; Berkeley Springs, WV, USA (19 Sep 1982).

Policy making process in Congress and the role of scientists in the process is discussed.

21816 (CONF-820970—, pp A.27-A.38) **Summary of some WMO activity relevant to atmospheric carbon dioxide.** Bojkov, R.D. (World Meteorological Organization, Geneva, Switzerland). Feb 1983. NTIS, PC A23/MF A01.

From Carbon dioxide research conference: carbon dioxide, science and consensus; Berkeley Springs, WV, USA (19 Sep 1982).

An overview of the project is presented. Specific topics receiving assistance are developing better monitoring methods for spatial and temporal distribution; analysis to determine sources and sinks; and greenhouse effect in actuality and forecast. Interdisciplinary relationships are considered. (PSB)

21817 **(EPA—450/3-80-007b) Surface coating of metal furniture - background information for promulgated standards.** (Environmental Protection Agency, Research Triangle Park, NC (USA). Office of Air Quality Planning and Standards). Oct 1982. 50p. NTIS, PC A03/MF A01.

Under the authority of Section III of the Clean Air Act, proposed standards were published in the Federal Register (45 FR 79390) with a request for public comment. A public hearing was held on January 9, 1981, and four speakers presented comments on the proposed standards. A total of ten commenters representing industry, trade associations, and a State air pollution control agency submitted written comments during the comment period. Their comments and EPA's responses are summarized in this document. The summary of comments and responses serves as the basis for the revisions that have been made to the proposed standards.

21818 **(NP—3900019) Relation between the Federal Law on Immission Control and the Private Neighbours Law.** Lorentz, H. (Mainz Univ. (Germany, F.R.). Fachbereich Rechts- und Wirtschaftswissenschaften). 15 Feb 1980. 284p. (In German). NTIS (US Sales Only), PC A13/MF A01. Order Number DE83900019.

Thesis.

The author shows the changes in the relation between Public and Private Neighbours Law caused by the Law on Immission Control. Those plants emitting in sovereignty are subject only to the public jurisdiction in regard to the procedural and material law. Also the task - in former times incumbent on property protection under civil law - to protect the individual against immissions has shifted to the public law. The author has the opinion that this task has actually been 'absorbed' by the public legal neighbour protection as a more current regulation. The most important reasons for this are that on the one hand the subjective public neighbours protection against plants requiring permission were extended and on the other hand that the range of civil protection is essentially included in the subjective public neighbours protection.

21819 **(PB—82-240318) Preliminary assessment of adverse health effects from carbon monoxide and implications for possible modifications of the standard.** (Environmental Protection Agency, Research Triangle Park, NC (USA). Office of Air Quality Planning and Standards). 1 Jun 1979. 37p. NTIS, PC A03/MF A01.

The purpose of this paper is to evaluate the key studies in the EPA document, Air Quality Criteria for Carbon Monoxide, and identify the critical elements to be considered in the possible revision of the primary carbon monoxide (CO) National Ambient Air Quality Standard (NAAQS). The paper also identifies critical factors that must be considered in selecting an adequate margin of safety for the CO air quality standard.

21820 **(PB—82-240326) Environmental impact assessment of control measures required for attainment of the national ambient air quality standard for ozone.** (Environmental Protection Agency, Research Triangle Park, NC (USA). Office of Air Quality Planning and Standards). Jun 1978. 19p. NTIS, PC A02/MF A01.

The purpose of this assessment is to review the information presented in Air Quality Criteria for Ozone and other Photochemical Oxidants and Control Techniques for Hydrocarbons and Volatile Organic Compounds and to present an analysis of the environmental impact of control measures required for attainment of the air quality standard for ozone.

21821 **(PB—82-240615) Example Scope of Work for contracts to prepare SIP revisions to attain and maintain NAAQS. Guideline series.** Tyler, D.D. (Environmental Protection Agency, Research Triangle Park, NC (USA). Office of Air Quality Planning and Standards). 5 Nov 1976. 46p. (OAQPS—1.2-068). NTIS, PC A03/MF A01.

This example Scope of Work is intended to show what tasks should be considered in preparing contracts to develop SIP revisions for attainment and/or maintenance of the NAAQS where the provisions of 40 CFR 51 Subpart D apply. The tasks and procedures described in this example are based on 40 CFR Part 51 regulations, with emphasis on the provisions of Subpart D published May 3, 1976 (40FR 18382). Some of the individual tasks and procedures are not specifically required by the regulations, but are based on recommendations contained in the Air Quality Maintenance Guidelines or related guidelines.

21822 **(PB—82-241613) Guidelines for air quality maintenance planning and analysis. Volume 5: Case studies in plan development.** (Environmental Protection Agency, Research Triangle Park, NC (USA). Office of Air Quality Planning and Standards). Dec 1974. 155p. NTIS, PC A08/MF A01.

This document presents the digests of four full text trial Air Quality Maintenance Plans from San Diego, St. Louis, Baltimore, and Denver. The subjects covered in each trial are: characteristics of the study areas, intergovernmental cooperation, baseline emissions inventory, emissions projections, baseline air quality, air quality projections, selection of maintenance strategies, and legal authority. The trial AQMPs prepared during this study represent exercises to demonstrate administrative and technical procedures available and do not necessarily constitute final, acceptable plans.

21823 **(PB—82-242298) Vehicle refueling emissions seminar.** (American Petroleum Inst., Washington, DC). 5 Dec 1973. 106p. NTIS, PC A06/MF A01.

This seminar focuses on the overriding regulatory aspects of refueling vapor control in response to the Clean Air Act. There are discussions on the current status on research and control technology of refueling emissions, the implementation capabilities, both present and future, the recovery equipment available, and the future outlook. There is an overview of the consideration of controls. Photographs and charts included.

21824 **(PB—82-242447) Air quality non-attainment areas in Region V.** Dahl, C.L.; Soehngen, J.R.; Hamlin, C. (Envirodyne Engineers, Inc., St. Louis, MO (USA)). Jun 1982. 111p. NTIS, PC A06/MF A01.

This document illustrates the attainment/non-attainment designations for the five criteria pollutants (sulfur dioxide, total suspended particulates, ozone, carbon monoxide and nitrogen dioxide) for the states comprising USEPA - Region V (Illinois, Indiana, Michigan, Minnesota, Ohio and Wisconsin). The air quality designations detailed in these maps are based upon information available as of March, 1982. These attainment status designations are pursuant to the requirements of Section 107 of the Clean Air Act, as amended in 1977, and are codified in Subpart C of Part 81 of Chapter 1, Title 40, Code of Federal Regulations. For additional information regarding current air quality data, legal and procedural requirements for attainment/non-attainment areas, etc., the appropriate regional, state or local environmental agencies should be contacted.

51 ENVIRONMENTAL SCIENCES, TERRESTRIAL

5101 Basic Studies

REFER ALSO TO CITATION(S) 21895

5102 Chemicals Monitoring And Transport

REFER ALSO TO CITATION(S) 19731, 19735, 21761, 21773, 21799

21825 (CONF-8103155—, pp 65-90) **Pollutant uptake by plants.** Kloke, A. 1981. (In German). NTIS (US Sales Only), PC A06/MF A01.

From 17. meeting on municipal composts and food quality; Speyer, F.R. Germany (26 Mar 1981).

The uptake of pollutant elements from the ground increases with their concentration in the ground. As for the distribution of these elements in cereals, we can distinguish four groups: 1) Concentration in the crop higher than in the straw: Magnesium; 2) Equal concentrations in crop and straw: Zinc, manganese, copper, cobalt, selenium; 3) Lower concentrations in the crop than in the straw: Molybdenum, arsenic, lead, nickel, cadmium, mercury; 4) Concentration in the crop hardly changed with increasing concentration in the straw: Chromium, fluorine, vanadium. The degree of the cadmium uptake does not only depend on the plant species but it also changes with the variety and the line within one variety. The higher the soil acidity, the higher is the uptake of heavy metals, especially cadmium.

21826 **(DOE/EV/70272—T1) Carbon balance of world forests and their associated soils. Progress report, August 1, 1977-September 30, 1978.** Zinke, P.J. (California Univ., Berkeley (USA)). Dec 1978. Contract AT03-76EV70272. 11p. NTIS PCE04/MF $6.35. Order Number DE83005079.

An initial approach was made to the evaluation of total carbon storage in various soils of tropical and temperate forests. Data from published soils analyses related to soil surveys in various regions of the world were gathered, tabulated, and coded for computer analysis. Software programs were designed to tabulate, calculate carbon storages and aggregate data as cumulative probability distributions of soil storage of carbon expressed as weight of the element per square meter to a meter depth of soil.

21827 **(EPA—560/5-82-004) Chemicals identified in feral and food animals: a data base. Volume II. Records 533-1515. Second annual report, October 1982.** Cone, M.V.; Faust, R.A.; Baldauf, M.F. (comps.). (Oak Ridge National Lab., TN (USA)). Dec 1982. Contract W-7405-ENG-26. 400p. (ORNL/EIS—196-Vol.2). NTIS (US Sales Only). Order Number DE83006368.

A comprehensive data base of chemicals identified in feral and food animals has been established. This effort has grown out of the concern over continuing reports of toxic chemicals in human tissues and body fluids. Feral populations and food animals are regarded as indicators of environmental contamination and subsequent human body burden. This data file is a companion to Chemicals Identified in Human Biological Media, A Data Base, and follows basically the same format. Data were obtained primarily from the open literature through manual searches (retrospective to 1979). The data base contains information on 134 different substances.

21828 **(NP—3901010) Study of endogenous and exogenous influence on lead (Pb) and cadmium (Cd) content in muscles and organs of deer (Capreolus capreolus L.) and wild rabbit (Lepus cuniculus L.).** Schinner, W. (Giessen Univ. (Germany, F.R.). Fachbereich Veterinaermedizin und Tierzucht). 9 Mar 1981. 215p. (In German). NTIS (US Sales Only), PC A10/MF A01. Order Number DE83901010.

In 1977 and 1978, 140 roe deer, 9 red deer and 55 wild rabbits from estates in North Bavaria where relative little Pb and Cd was found and from an area with a lot of Pb and Cd had been examined in regard to their Pb- and Cd-contents in their kidneys, livers and muscles. The kidneys of the roe deers normally contained the highest contents of Pb and Cd, followed by the livers and at least by the muscles.

21829 **(PB—80-167034) Sensitivity of soil regions to acid precipitation.** McFee, W.W. (Purdue Univ., Lafayette, IN (USA). Dept. of Agronomy). Jan 1980. 189p. (EPA—600/3-80-013). NTIS.

Atmospheric deposition of acid and other materials may pose a significant threat to some soils and the ecosystems they support. The project objective was to develop maps of the eastern United States that delineate soil areas according to their expected sensitivity to the effects of acid precipitation. Four parameters are important in estimating soil sensitivity to acid precipitation: (1) the total buffering capacity or cation exchange capacity; (2) the base saturation; (3) the management system imposed on the soil; and (4) the presence or absence of carbonates in the soil profile. Cation-exchange capacity was chosen as the primary criterion for classifying the soil regions into non-sensitive, slightly sensitive, and sensitive areas. The North Central States were found to contain, generally, non-sensitive to slightly sensitive soils. The Northeastern States include large regions of slightly sensitive to sensitive soils, and the Central States feature large portions in the slightly sensitive category with varying degrees of inclusions. Maps of these distributions have been prepared for individual states and for the entire eastern United States.

21830 **(PB—82-219437) Power plant cumulative environmental impact report. Final report.** (Maryland Dept. of Natural Resources, Annapolis (USA). Power Plant Siting Program). Feb 1982. 354p. NTIS, PC A16/MF A01.

This report presents the results of studies conducted by the Power Plant Siting Program (PPSP) to determine the cumulative impact of power plants on Maryland's environment. Included in this report are: (1) current and projected power demands and consumption in Maryland; (2) current and planned power generation; (3) air impacts; (4) aquatic effects; (5) radiological effects; (6) social and economic considerations; (7) noise impacts; (8) groundwater effects; (9) solid waste management concerns; (10) transmission line impacts; and (11) descriptions of cooling towers in Maryland. Also contained is the 1982 Ten Year Plan of Maryland Electric Utilities.

5103 Radioactive Materials Monitoring And Transport

REFER ALSO TO CITATION(S) 19829, 19879, 19883, 19884, 19885, 19889, 19890, 19894, 21587, 21761, 21797, 21799, 21830, 21871, 21935, 21958

21831 **(DOE/EP—0038/1) Summary of annual environmental reports for CY 1981: Department of Energy nuclear sites.** (USDOE Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness, Washington, DC. Office of Operational Safety). Dec 1982. 52p. NTIS, PC A04/MF A01. Order Number DE83008175.

During CY 1981, radiation exposures to off-site populations from Department of Energy (DOE) nuclear facilities were well within regulatory limits. The maximum reported individual whole body dose to any member of the public from any DOE site was 15 mrem for the year. This can be compared to the 130 mrem average background exposure received each year by an individual living in the United States (EPA 1977). The total population dose received by individuals living within an 80-km (50-mi) radius of these sites was 230 man-rem from DOE operations, compared to a total of nearly eight million man-rem to the same populations from natural sources. Nonradiological releases in site effluents were generally within prescribed regulatory limits, with several facilities having pollution abatement projects planned or under construction to correct noncompliance conditions. Inadvertent releases of radioactive and nonradioactive pollutants had no significant health or ecological impacts.

21832 **(EML—412) Environmental Measurements Laboratory. Environmental report, March 1-September 1, 1982.** Hardy, E.P. Jr. (Department of Energy, New York (USA). Environmental Measurements Lab.). 1 Nov 1982. 285p. NTIS, PC A13/MF A01. Order Number DE83005501.

This report presents current information from the EML environmental programs, the Radiological and Environmental Research Division at Argonne National Laboratory and the National Radiation Laboratory of the New Zealand Department of Health. Annual summaries of strontium-90 in New York and San Francisco diets and human bone are presented in the initial section. The second section presents recent data from EML programs: quarterly strontium-90 deposition, radioactivity in the lower stratosphere, strontium-90 in New York and San Francisco diet, milk and tap water, and cesium-137 in tap water. The third section presents data from Argonne National Laboratory on cesium-137 in Chicago food and from the National Radiation Laboratory in New Zealand on environmental radioactivity. A bibliography of recent publications related to environmental studies is presented in the fourth section. Six of the sections have been abstracted and indexed individually for EDB/ERA/INS.

21833 (EML—412, pp I.3-I.20) **Strontium-90 in the diet: results through 1981.** Klusek, C.S. (Environmental Measurements Lab., New York, NY). 1 Nov 1982. NTIS, PC A13/MF A01.

In Environmental Measurements Laboratory. Environmental report, March 1-September 1, 1982.

Estimates of ^{90}Sr intake via the total diet in New York City and San Francisco have been made since 1960 from quarterly food samplings and average consumption statistics. The dietary intakes of ^{90}Sr have decreased from the maximum levels attained during 1963-1964, but the declines have become more gradual in recent years due to the continuing small amounts of ^{90}Sr deposition and the little-changing cumulative deposit of ^{90}Sr in soil. The annual intake in 1981 averaged 6.0 pCi/day (0.22 Bq/day) in New York, unchanged from the previous year, and 2.4 pCi/day (0.088 Bq/day) in San Francisco, slightly lower than the results of the previous year. Further gradual reductions in ^{90}Sr intake are anticipated during 1982.

21834 (EML—412, pp I.21-I.34) **Strontium-90 in human bone: 1981 results for New York City and San Francisco.** Klusek, C.S. (Environmental Measurements Lab., New York, NY). 1 Nov 1982. NTIS, PC A13/MF A01.

In Environmental Measurements Laboratory. Environmental report, March 1-September 1, 1982.

Results are presented of determinations of Sr-90 content of 102 specimens of vertebrae obtained during 1981 in New York City and San Francisco. The average Sr-90 to Ca ratios for adult vertebrae are 0.95 pCi/g Ca (0.037 Bq/g Ca) in New York and 0.61 pCi/g Ca (0.023 Bq/g Ca) in San Francisco, little changed from the average values of the previous year. Average Sr-90 concentrations in children's bone are now little different from the adult values. A two compartment bone model, which accounts for both short and long term retention of Sr-90 in bone, is used to describe the variations of Sr-90 content of bone and provide correlation with dietary Sr-90 intake. Regression analysis of the 21 years of survey data provides values of the relative retention of dietary Sr-90 and the effective bone turnover rates. The bone model gives satisfactory description of observed Sr-90 levels and allows reliable assessment of the long-term behavior of Sr-90 in man.

21835 (EML—412, pp II.185-II.198) **Radiostrontium in milk and tap water.** 1 Nov 1982. NTIS, PC A13/MF A01.

In Environmental Measurements Laboratory. Environmental report, March 1-September 1, 1982.

The New York City sample is a monthly composite of pasteurized milk purchased week days at retail stores. The monthly Sr-90 to calcium ratios for New York City since the inception of the sampling program are presented. In the monitoring of Sr-90 and Cs-137 in New York City tap water, samples were taken daily so that by the end of the month, approximately 100 liters were collected. The Sr-90 data since the inception of the program are presented. The available cesium-137 data expressed as the Cs-137 to Sr-90 ratio are also tabulated. Tap water sampling and analysis were terminated in October 1981.

21836 (EML—412, pp III.3-III.6) **Cesium-137 in various Chicago foods: (collection month, April 1982).** Karttunen, J.O. (Argonne National Lab., IL). 1 Nov 1982. NTIS, PC A13/MF A01.

In Environmental Measurements Laboratory. Environmental report, March 1-September 1, 1982.

Since April 1961, the ^{137}Cs and potassium content of the Chicago portion of the Tri-City Diet Sampling program has been determined in bulk food samples by gamma-ray spectrometry using a 4" x 4" NaI (Tl) crystal. Each variety of food (all fresh vegetable, all fresh fruit, etc.) is composited before measurement, and each sample is counted 400 to 1000 minutes. From each measurement composite daily and yearly food intakes are obtained. The results for the April 1982 semi-annual sampling are tabulated.

21837 (INIS-mf—7499, pp v) **Study of natural gamma background from geological ground rock in Central Slovakian Region.** Cajda, I. (Krajska Hygienicka Stanica, Oddelenie Hygieny Ziarenia, Banska Bystrica (Czechoslovakia)). 1980. (In Slovak). .

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

Published in summary form only.

21838 (NUREG—0837-V1-N4) **NRC TLD direct radiation monitoring network: Progress report, October-December 1981. Technical report.** Costello, F.; Thompson, T.; Cohen, L. (Nuclear Regulatory Commission, King of Prussia, PA (USA). Region I). Jun 1982. 173p. NTIS, PC A08/MF A01.

The report provides the status and results of the NRC Thermoluminescent Dosimeter (TLD) Direct Radiation Monitoring Network. It presents the radiation levels measured in the vicinity of NRC licensed facility sites throughout the country for the fourth quarter of 1981.

21839 (NUREG/CP—0039, pp P.1-P.50) **Off-site dose calculations.** Eckerman, K.F. (Oak Ridge National Lab., TN). Dec 1982. NTIS, PC A99/MF A01.

From Health physics summer school on selected topics in reactor health physics; Lexington, KY, USA (14 Jun 1981).

Each stage of the nuclear fuel cycle involves some release of waste radionuclides to the environment. The role of numerical modeling in assessing the environmental impact of these releases has increased in recent years due to the complexity of the issues involved: potential health effects, economics, and in some cases, the welfare of unborn generations. These issues require evaluation and examination in a systematic, reproducible manner. The objective of numerical modeling is to provide the decision maker with a synthesis of knowledge from many disciplines organized in a logical and coherent fashion. In a more limited application, radiological modeling is used to assess whether a proposed facility is designed in a manner to be operated within existing regulatory requirements or whether an operational facility is in compliance with regulatory requirements. This paper summarizes the present role of modeling for such decisions.

21840 **Iodine-129 in rabbit thyroids near a nuclear fuel reprocessing plant in Idaho.** Fraley, L. Jr.; Bowman, G.C. (Colorado State Univ., Fort Collins (USA). Dept. of Radiology and Radiation Biology); Markham, O.D. (Department of Energy, Idaho Falls, ID (USA). Idaho Operations Office). *Health Physics;* **43**: No. 2, 251-258(Aug 1982).

The ^{129}I/^{127}I atom ratios in rabbits collected on the INEL site were larger than ratios in rabbits from a control area. Maximum ^{129}I/^{127}I atom ratios (9.1×10^{-4}) occurred near the Idaho Chemical Processing Plant (ICPP). Based on rabbit thyroid concentrations, the ^{129}I appeared to be deposited primarily in the direction of the predominant winds from the ICPP, northeast and southwest. Dose rates from the ^{129}I to thyroids of INEL rabbits varied from 0.1 to 260 μGy/y (0.01 to 26 mrad/y). Iodine-129 atmospheric releases from the ICPP appeared to have increased the ^{129}I/^{127}I atom ratios on and near the INEL site.

21841 **Influences of pH, temperature, and moisture on gaseous tritium uptake in surface soils.** Fallon, R.D. (Savannah River Lab., Aiken, SC). *Applied and Environmental Microbiology;* **44**: No. 1, 171-178(Jul 1982).

In South Carolina surface soils, the uptake of gaseous tritium (T_2, HT, or both) showed a broad optimal temperature response from about 20 to 50°C, with the highest rates at 35 to 45°C. The optimal pH was in the range of 4 to 7. Uptake rates declined at the wet and dry extremes in soil moisture content. Inhibition seen upon the addition of hydrogen or carbon monoxide to the soil atmosphere suggested that hydrogenase may be responsible for T_2-HT uptake in soil. During the period of most rapid recovery in a 36-day incubation of reinoculated, sterilized soil, T_2-HT uptake rates doubled every 2 to 4 days. Thus, T_2-HT uptake appears to be biologically mediated. Soil uptake of T_2-HT was not severly limited by pH, temperature, or moisture in the soils tested. Thus, rapid exchange of gaseous tritum into soil water must be expected and accounted for in modeling the isotope distributions around nuclear facilities.

5105 Site Resource And Use Studies

REFER ALSO TO CITATION(S) 19597, 19859, 19860

21842 (E—82-10247) **LANDSAT remote sensing: observations of an Appalachian mountaintop surface coal mining and reclamation operation.** (National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center). Oct 1979. 7p. (NASA-TM—84194). NTIS, PC A02/MF A01.

REF Original contains color imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 Original contains color illustrations ERTS.

The potential benefits of using LANDSAT remote sensing data by state agencies as an aide in monitoring surface coal mining operations are reviewed. A mountaintop surface mine in eastern Kentucky was surveyed over a 5 year period using satellite multispectral scanner data that were classified by computer analyses. The analyses were guided by aerial photography and by ground surveys of the surface mines procured in 1976. The application of the LANDSAT data indicates that: (1) computer classification of the various landcover categories provides information for monitoring the progress of surface mining and reclamation operations, (2) successive yearly changes in barren and revegetated areas can be qualitatively assessed for surface mines of 100 acres or more of disrupted area, (3) barren areas consisting of limestone and shale mixtures may be recognized, and revegetated areas in various stages of growth may be identified against the hilly forest background.

21843 (LA—9576-MS) **Vegetational analysis of a canyon ecosystem at Los Alamos.** Foxx, T.S.; Tierney, G.D. (Los Alamos National Lab., NM (USA)). Nov 1982. Contract W-7405-ENG-36. 28p. NTIS, PC A03/MF A01. Order Number DE83008277.

The floristic composition of the area immediately below a peregrine falcon nesting site was determined. The objective was to determine if any plants found within the disturbed area were key food species for either doves or rodents. Mourning doves are frequent prey of the peregrine and rodents attract owls that are occasional predators on the falcons. (ACR)

21844 (PB—82-214008) **Notification of hazardous waste sites required under Section 103(c) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980: EPA region 2.** (Environmental Protection Agency, Washington, DC (USA)). Mar 1982. 311p. NTIS, PC A14/MF A01.

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 PL 96-510 (commonly known as Superfund) mandates in Section 103(c) that certain persons notify the U.S. Environmental Protection Agency (EPA) by June 9, 1981 of the existence of sites where hazardous wastes from industries, businesses, government, hospitals, and other sources are stored, treated or disposed of. This document comprises a listing of 8,755 notifications of hazardous waste sites. For each notification, the listing summarizes the location, the persons required to notify, the amount and type of any hazardous waste to be found on the site reported, and any known or suspected releases of hazardous wastes. The CERCLA 103(c) notification was mandated to help EPA and State and local governments remedy problems created by uncontrolled hazardous waste disposal. This document contains ten volumes, one for each EPA region. Within each volume, the notifications are presented alphabetically by state and site name within each state, respectively.

21845 (PB—82-214016) **Notification of hazardous waste sites required under Section 103(c) of the CompRehensive Environmental response, Compensation and Liability Act (CERCLA) of 1980: EPA region 3.** (Environmental Protection Agency, Washington, DC (USA)). Mar 1982. 367p. NTIS, PC A16/MF A01.

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 PL 96-510 (commonly known as Superfund) mandates in Section 103(c) that certain persons notify the U.S. Environmental Protection Agency (EPA) by June 9, 1981 of the existence of sites where hazardous wastes from industries, businesses, government, hospitals, and other sources are stored, treated or disposed of. This document comprises a listing of 8,755 notifications of hazardous waste sites. For each notification, the listing summarizes the location, the persons required to notify, the amount and type of any hazardous waste to be found on the site reported, and any known or suspected releases of hazardous wastes. The CERCLA 103(c) notification was mandated to help EPA and State and local governments remedy problems created by uncontrolled hazardous waste disposal. This document contains ten volumes, one for each EPA region. Within each volume, the notifications are presented alphabetically by state and site name within each state, respectively.

21846 (PB—82-214032) **Notification of hazardous waste sites required under Section 103(c) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980: EPA region 5.** (Environmental Protection Agency, Washington, DC (USA)). Mar 1982. 719p. NTIS, PC A99/MF A01.

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 PL 96-510 (commonly known as Superfund) mandates in Section 103(c) that certain persons notify the U.S. Environmental Protection Agency (EPA) by June 9, 1981 of the existence of sites where hazardous wastes from industries, businesses, government, hospitals, and other sources are stored, treated or disposed of. This document comprises a listing of 8,755 notifications of hazardous waste sites. For each notification, the listing summarizes the location, the persons required to notify, the amount and type of any hazardous waste to be found on the site reported, and any known or suspected releases of hazardous wastes. The CERCLA 103 (c) notification was mandated to help EPA and State and local governments remedy problems created by uncontrolled hazardous waste disposal. This document contains ten volumes, one for each EPA region. Within each volume, the notifications are presented alphabetically by state and site name within each state, respectively.

21847 (PB—82-214057) **Notification of hazardous waste sites required under Section 103(c) of the CompRehensive Environmental response, Compensation and Liability Act (CERCLA) of 1980: EPA region 7.** (Environmental Protection Agency, Washington, DC (USA)). Mar 1982. 211p. NTIS, PC A10/MF A01.

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 PL 96-510 (commonly known as Superfund) mandates in Section 103(c) that certain persons notify the U.S. Environmental Protection Agency (EPA) by June 9, 1981 of the existence of sites where hazardous wastes from industries, businesses, government, hospitals, and other sources are stored, treated or disposed of. This document comprises a listing of 8,755 notifications of hazardous waste sites. For each notification, the listing summarizes the location, the persons required to notify, the amount and type of any hazardous waste to be found on the site reported, and any known or suspected releases of hazardous wastes. The CERCLA 103(c) notification was mandated to help EPA and State and local governments remedy problems created by uncontrolled hazardous waste disposal. This document contains ten volumes, one for each EPA region. Within each volume, the notifications are presented alphabetically by state and site name within each state, respectively.

21848 (PB—82-927905) **Maps: Poland, Eastern Europe: major power facilities.** (Central Intelligence Agency, Washington, DC (USA)). Jun 1980. 6p. NTIS PC E02.

The document is a page-size map of Poland with populated places, administrative divisions, major transportation routes. Map no. 502800 has terrain shading, no. 502799 excludes terrain. Map scale is 1:4,700,000. Included are maps of Eastern Europe showing major power facilities and major gas facilities. Map scales of Eastern Europe are 1:10,000,000.

21849 **(UCID—19680) Precision-leveling surveys near the Lawrence Livermore National Laboratory site (1969 through 1980).** Crow, N.B. (Lawrence Livermore National Lab., CA (USA)). 10 Feb 1983. Contract W-7405-ENG-48. 16p. NTIS, PC A02/MF A01. Order Number DE83007661.

Precision-leveling surveys near the Lawrence Livermore National Laboratory site were made by the California Department of Water Resources (1969 through 1980). Overall vertical motion was small. The data show that environmentally insiginificant subsidence occurred over the Livermore oil field, mostly before 1975. There is also evidence for a northerly tilt along the California aqueduct between 1978 and 1979. The magnitude of the tilt is small (about 1 cm) but consistent. The magnitude is relatively close to the inherent error of the measurements (about 4 mm), so that this interpretation must be treated with caution.

21850 **(USGS/MAP/L—133) Land use and land cover, 1978 Hot Springs, South Dakota, Nebraska.** (Geological Survey, Denver, CO (USA)). 1980. 8p. Geological Survey, Box 25286, Federal Center, Denver, CO 80225.

Land use and land cover of the area surrounding Hot Springs, South Dakota in 1978 is presented in map form. (ACR)

5106 Regulations

REFER ALSO TO CITATION(S) 19591, 20812, 21818

52 ENVIRONMENTAL SCIENCES, AQUATIC

5201 Basic Studies

REFER ALSO TO CITATION(S) 20266

21851 (CONF-820970—, pp IV.3-IV.50) **West Antarctic ice sheet: diagnosis and prognosis.** Bentley, C.R. (Univ. of Wisconsin, Madison). Feb 1983. NTIS, PC A23/MF A01.

From Carbon dioxide research conference: carbon dioxide, science and consensus; Berkeley Springs, WV, USA (19 Sep 1982).

Field data from Antarctica strongly suggest that the ice sheet, if it is changing at all, is growing rather than shrinking. Evidence for this is particularly good in the Ross Sea and Pine Island Glacier drainage systems. The implication for the future is that from natural causes alone the ice shelf is more likely to increase in thickness than to decrease; in fact, there is a distinct possibility of a surging history and a present-day build-up towards a future surge. Furthermore, it appears that the ice shelf would be relatively invulnerable to the most direct effects of climatic warming: a temperature rise would take many hundreds of years to penetrate deeply into the shelf, and increased precipitation on the shelf can be expected to have only a minor effect. However, increased bottom melting could be much more effective: if there were to be an oceanic temperature increase of several degrees it is possible that a substantial thinning could occur in a hundred years. A maximum-reasonable-rate analysis of the problems relating to rapid evacuation of the large volume of West Antarctic ice leads to an estimate of 500 years for the minimum time required. It is concluded that the West Antarctic ice sheet is currently healthy and will probably be around for many centuries to come.

21852 **(DOE/EV/10250—1) Lagrangian and Eulerian diffusion study in the coastal surface layers. Final report, 1 July 1979-30 September 1982.** Okubo, A.; Carter, H.H.; Wilson, R.E.; Sanderson, B.G.; Partch, E.N. (State Univ. of New York, Stony Brook (USA). Marine Sciences Research Center). 1982. Contract AC02-79EV10250. 321p. NTIS, PC A14/MF A01. Order Number DE83007505.

This report provides details of the field studies, experimental results, and an analysis and discussion of both dye patch and plume experiments. The time rate of change of variance relative to the centroid for the dye patches and the time rate of change of variance, both relative and absolute, for the dye plumes are presented. For each drogue experiment, results are provided in terms of the time rate of change of the drogue cluster centroid, of the cluster variance and covariance and variance relative to the cluster principal axis, of the cluster rotation and elongation, of diffusivities, of velocity gradients and velocity gradient parameters, i.e., divergence, shear, vorticity, etc., and of the cluster areas both measured and predicted. Rotational invariants (rotary auto spectra and cross spectra) of the current meter records are presented as are mean values of the alongshore and on/offshore components of the current and horizontal and vertical velocity gradients.

21853 **(EPRI-EA—2059-Vol.2) Assessment methodology for new cooling lakes. Volume 2. Development of empirical multivariate relationships for evaluating fish communities in new cooling lakes. Final report.** Grieb, T.M.; Porcella, D.B.; Ginn, T.C.; Lorenzen, M.W. (Tetra Tech, Inc., Lafayette, CA (USA)). Feb 1983. 108p. NTIS, PC A06/MF A01. Order Number DE83901463.

Numerical classification techniques were used to define groups of lakes with distinct fish community attributes. Simple linear and multiple regression were then used to identify the important environmental variables affecting the fish communities. Next, the multivariate statistical technique of discriminant analysis was tested and shown to predict the groups of lakes (defined in the initial step of classification) using the identified environmental variables. Classification equations derived in the discriminant analysis enable the user to predict fish community characteristics of a new lake. The equations combine the information from nine limnological parameters into a single index of classification. Based on the value of this index, the lake is classified into one of four distinct groups. The fishery characteristics of the indicated group are then used to predict fish community structure and recreational fishery use. Angler-use estimates for the group are used to project multiple use benefits.

21854 **(N—8228688) Biota and biological principles of the aquatic environment.** Greeson, P.E. (Geological Survey, Washington, DC (USA)). 1982. 52p. (CIRC—848-A). NTIS, PC A04/MF A01.

The first of several compilations of briefing papers on water quality prepared by the U.S. Geological Survey is presented. Each briefing paper is prepared in a simple, nontechnical, easy to understand manner. This U.S. Geological Survey Circular contains papers on selected biota and biological principles of the aquatic environment. Briefing papers are included on Why biology in water quality studies , Stream biology, Phytoplankton, Periphyton, Drift organisms in streams, Family Chironomidae (Diptera), Influences of water temperature on aquatic biota, and Stream channelization: Effects on stream fauna.

21855 **(TVA/PUB—83/28) Optimization of biological recycling of plant nutrients in livestock waste by utilizing waste heat from cooling water.** Maddox, J.J.; Behrends, L.L.; Burch, D.W.; Kingsley, J.B.; Waddell, E.L. Jr. (Tennessee Valley Authority, Muscle Shoals, AL (USA). Div. of Agricultural Development). May 1982. 155p. (EPA—600/7-82-041). NTIS, PC A08/MF A01. Order Number DE83901674.

Results are presented from a 5-year study to develop aquatic methods which beneficially use condenser cooling water from electric generating power plants. A method is proposed which uses a system for aquatic farming. Livestock waste is used to fertilize planktonic algae production and filter-feeding fish are used to biologically harvest the algae, condenser cooling water (simulated) is used to add waste heat to the system, and emergent aquatic plants are used in a flow through series as a bio-filter to improve the water quality and produce an acceptable discharge. Two modes of operation were tested; one uses untreated swine manure as the source of aquatic fertilizer and the other uses anaerobic digester waste as a means of pretreating the manure to produce an organic fertilizer. A set of operating conditions (temperature, retention time, fish stocking rate, fertilizer rates, land and water requirements, suggested fish and plant species, and facility design) were developed from these results. The integrated system allows continual use of power plant condenser cooling water from plants in the southeastern United States.

5202 Chemicals Monitoring And Transport

REFER ALSO TO CITATION(S) 19721, 19722, 19729, 19731, 19732, 19733, 19734, 19762, 19881, 20255, 21258, 21690, 21694, 21761, 21830, 22027

21856 (AD-A—115428/5) **Offshore transport and dispersion in the California coastal region - BLM III. NPS data summary. Technical report.** Schacher, G.E.; Spiel, D.E.; Leonard, C.A. (Naval Postgraduate School, Monterey, CA (USA)). 1 May 1982. 98p. (NPS—61-82-004). NTIS, PC A05/MF A01.

The third in a series of tracer measurements of overwater transport and diffusion has been completed. This report includes the meteorological data obtained aboard the RV/Acania. Analyses of radiosonde data to yield mixed layer parameters for mixed layer assessment is also included.

21857 (CONF-820970—, pp II.123-II.145) **Geographical, seasonal, and secular variations of the partial pressure of CO_2 in surface waters of the North Atlantic Ocean: the results of the North Atlantic TTO Program.** Takahashi, T. (Columbia Univ., Palisades, NY); Chipman, D.; Volk, T. Feb 1983. NTIS, PC A23/MF A01.

From Carbon dioxide research conference: carbon dioxide, science and consensus; Berkeley Springs, WV, USA (19 Sep 1982).

Measurements of the partial pressure of CO_2 in surface water made during the seven-month long Transient Tracers in Oceans Expedition in the North Atlantic (TTO/NA), April-October 1981, are summarized to show the geographical, seasonal, and secular variations in surface water pCO_2. The pCO_2 and temperature data show four distinct trends, each characteristic of the surface ocean circulation regimes. A systematic trend of 4.3%pCO_2/°C is observed in the Norwegian-Greenland Sea and in the Labrador Sea. On the other hand, in the Sargasso Sea and in the area of the Antilles Current, another systematic trend of 1.2%pCO_2/°C is observed. The seasonal variations in pCO_2 and tempertaure observed at three geographical locations appear to be consistent with this trend. These pCO_2-temperature relationships are a manifestation of complex interactions between various oceanographic processes, such as CO_2 gas exchange between air and sea, mixing depth of surface layer, upwelling of deep waters, biological activities and seasonal temperature changes in surface water. Progress made to date for understanding of the origin of these relationships is discussed.

21858 (ESA-SP—167) **Application of remote sensing data on the continental shelf: proceedings of an EAREL-ESA symposium.** Longdon, N.; Levy, G. (European Space Agency, 75 - Paris (France)). Jul 1981. 298p. NTIS, PC A13/MF A01.

A symposium which studied the application of remote sensing techniques to oceanography, fishing, pollution monitoring, and coastal zone management is reported. National programs, operational requirements, and state of the art are reviewed. The use of satellites, including LANDSAT, Seasat and ERS is highlighted.

21859 (Juel-Spez—163) **Methods for the ecotoxicological evaluation of chemicals. Vol. 1.** Biehl, H.M.; Fuehr, F.; Seibert, K. (Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.)). Jul 1982. 153p. (In German). NTIS (US Sales Only), PC A08/MF A01. Order Number DE83750300.

In 8 research reports test methods are presented, which deal with the degradation potential, accumulation and effects of chemicals in the aquatic environment. These projects had been carried out in the frame of the program 'Methods for the ecotoxicological evaluation of chemicals' financed by the Federal Minister for Research and Technology since 1978. The degradation behaviour under aerobic and unaerobic conditions, the bioaccumulation and elimination and sublethal effects of chemicals on different aquatic organisms were studied in detail. Moreover the usefullness of artifical ponds for ecotoxicological testing of chemicals had been examined. To check the scope of the test methods and to guarantee the comparability of the results, reference-chemicals had been introduced in nearly all projects.

21860 (Juel-Spez—163, pp 8-19) **Investigations with respect to a test system for biodegradability evaluations under the aspects of surface waters and sewage treatment plants.** Fischer, W.K.; Gerike, P. Jul 1982. (In German). NTIS (US Sales Only), PC A08/MF A01.

In Methods for the ecotoxicological evaluation of chemicals. Vol. 1.

In the course of this project the following aspects were treated: - Three carbon analyzers were investigated with respect to correctness, reproducibility and sensitivity. It was shown, that biodegradability evaluations in the OECD Screening Test are analytically possible with starting concentrations corresponding to >= 5 mg/l C. - A procedure for the Modified OECD Screening Test was made available. Since the test will be part of annex V of the sixth amendment to the 1967 directive (i.e., the European Chemicals Law) the procedure is presently being worked over editorially within the EEC. As a part of this project the test was evaluated with respect to reproducibility. Although it is not optimal yet from a purely statistical viewpoint, it proved adequate for the intended purpose of determining 'ready biodegradability'. - Besides the Modified OECD Screening Test seven other important biodegradability tests were characterized with respect to their relevance on the ground of the results obtained with 44 compounds. The division of the tests into those for 'ready' and 'inherent biodegradability' and simulation tests as it has been recommended by the OECD Expert Group 'Degradation/Accumulation' is based on this correlation study.

21861 (Juel-Spez—163, pp 111-126) **Studies of sorption and remobilization of chemicals in artificial and natural sediments.** Bibo, J.; Mueller, G. Jul 1982. (In German). NTIS (US Sales Only), PC A08/MF A01.

In Methods for the ecotoxicological evaluation of chemicals. Vol. 1.

Within the framework of the present experimental series it was attempted to determine the geo- and bioaccumulation behaviour of Benzopyrene in order to estimate the corresponding rates of concentration. The geoaccumulation behaviour was investigated in adsorption and desorption experiments on various clay minerals and natural sediments. Adsorption data gained are well described by Freundlich adsorption isotherms. The Ksub(f) values lay between 209 (quartz) and 1170 (sediment from a clay pit). A significant dependence of adsorption and desorption isotherms on sediment parameters could not be determined. The adsorption processes are subject to an entropic effect that is influenced by the solution characteristics. So-called 'hydrophobic bonding' is the result. In bioaccumulation experiments the transfer of Benzopyrene from contaminated sediment into sediment-living organisms (Tubificidae) was investigated. The factors of transfer thus determined were in the range of 1. Major factors influencing the accumulation of Benzopyrene in tubificidae included temperature and the type of sediment. There was insufficient evidence to indicate that the uptake processes occurred from Benzopyrene concentrations in interstitial water; mobilization processes from sediment during intestinal passage probably played a role, but this has not been clearly defined.

21862 (Juel-Spez—163, pp 127-153) **Studies of using artificial ponds for ecotoxicological examination of chemicals.** Hansen, P.D. Jul 1982. (In German). NTIS (US Sales Only), PC A08/MF A01.

In Methods for the ecotoxicological evaluation of chemicals. Vol. 1.

Investigations on how to provide ecosystems in artificial ponds were carried out. The ponds were filled with water of different origin and composition. The species and numbers of the plankton organisms in the artificial ponds were determined. Experiments were carried out to ensure equal growing rates and comparable variations of the species in the ponds (volume=10 m^3). The composition and numbers of the plankton species were dominated by the green algae. The zooplankton and the plankton species in general were very poor. It was confirmed that the biocoenosis of the plankton organisms in artificial ponds could be a tool for ecotoxicological testing of chemicals under field situations. Criteria for the suitability are discussed. The studies on the basis of the present results, should be continued in stabilized ecosystems; further experiments are proposed.

21863 **(PB—83-118026) Report to the congress on ocean pollution, monitoring and research October 1980 through September 1981.** (National Oceanic and Atmospheric Administration, Rockville, MD (USA)). Jul 1982. 60p. NTIS, PC A04/MF A01.

This report summarizes the results of FY 1981 National Oceanic and Atmospheric Administration (NOAA) monitoring and research efforts under Title II of the Marine Protection, Research, and Sanctuaries Act of 1972 (P.L. 92-532). Section 201 of Title II assigns responsibility to the Department of Commerce for a comprehensive and continuing program of monitoring and research regarding the effects of dumping material into ocean waters, coastal waters, and the Great Lakes. Section 202 of Title II directs the Secretary of Commerce, in consultation with other appropriate parts of the U.S. Government, to 'initiate a comprehensive and continuing program of research with respect to the possible long-range effects of pollution, overfishing, and man-induced changes of ocean ecosystems.' The legislation also directs the Secretary of Commerce to report the findings from the monitoring and research programs to the Congress at least once a year. There are intrinsic difficulties, however, in distinguishing 'long-range' effects from the 'acute' effects of ocean dumping, or more generally of marine pollution. In response to these considerations and to the responsibilities assigned to NOAA under the National Ocean Pollution Planning Act (P.L. 95-273), NOAA has consolidated and coordinated its research efforts in these areas to make the overall program more cost-effective and productive.

21864 **(PB—80132004) Probable effects of acid precipitation on Pennsylvania waters.** Arnold, D.E.; Light, R.W.; Dymond, V.J. (Pennsylvania State Univ., University Park (USA). Pennsylvania Cooperative Fishery Research Unit). Jan 1980. 31p. (EPA—600/3-80-012). NTIS.

The purpose of this project was to search for and identify any trends in water chemistry and fish communities in Pennsylvania waters which would indicate that acid precipitation was affecting them adversely. No new data collection was to be included. Five existing data bases, including original data collected by the authors, were examined for the existence of water analyses from the same or nearby locations separated by at least one year. (Analyses involving known or suspected influence of acid mine drainage were omitted.) Of 983 analysis reports which were usable, there were 314 cases with two or more such points. Of these 107 or 34% showed a decrease in pH, alkalinity, or both. Average decrease in pH was 0.4 units with a maximum case of 1.3 units. Average decrease in alkalinity was 15.1 mg/1 (as $CaCO_3$) with a maximum case of 105 mg/1. The average time span between earliest and latest sample was 8.5 years. When the data were separated by physiographic provinces, it became apparent that although the majority of the decreases occurred in streams on the relatively insoluble rocks of the Allegheny Plateau, there were also many cases in the ridge-and-valley province and other regions. Many of these decreases are to pH levels considered marginal for growth and reproduction of trout and other fishes. Seventy-one of the 107 analyses showing decreased pH or alkalinity included fish collection data. In 40 of these cases (58%), the number of fish species present decreased as well. This report was submitted in fulfillment of Contract Number B0835NAEX under the sponsorship of the U.S. Environmental Protection Agency. This report covers a period from May to October, 1979, and work was completed as of October 1, 1979.

21865 **(PNL-SA—10533) Illustration of environmental fate modeling on a micro-computer.** Peloquin, R.A. (Pacific Northwest Lab., Richland, WA (USA)). Jan 1983. Contract AC06-76RL01830. 17p. (CONF-821173—1). NTIS, PC A02/MF A01. Order Number DE83007844.

From 3. annual meeting of the Society of Environmental Toxicology and Chemistry; Arlington, VA, USA (14 Nov 1982).

Mathematical models of ecosystems can be efficiently implemented on micro-computers. The advantages of using a micro-computer include greater convenience for the user and low capital and maintenance costs. This has been demonstrated by a computer program written for a micro-computer to implement a multi-compartmental pathway model. The eight compartment model simulates the fate of phenolics present in solvent-refined coal liquids when spilled into an aquatic environment. The computer code that implements the compartmental model was written in Microsoft BASIC-80 compiled under the CP/M operating system. The code can consequently be executed on any micro-computer which has sixty-five kilobytes of memory, 180 kilobytes of on-line storage, and operates under CP/M.

21866 **Spreading-boiling model for instantaneous spills of liquefied petroleum gas (LPG) on water.** Chang, H.R.; Reid, R.C. (Massachusetts Inst. of Tech., Cambridge). *Journal of Hazardous Materials;* **7**: No. 1, 19-35(Nov 1982).

An experimental and theoretical investigation was carried out to study the boiling and spreading of liquefied petroleum gas (LPG) on water, in a one-dimensional configuration. Experimental work involved the design and construction of a spill/spread/boil apparatus which permitted the measurement of spreading and local boil-off rates. With the equations of continuity and momentum transfer, a mathematical model was developed to describe the boiling-spreading phenomena of cryogens spilled on water. The model accounts for a decrease in the density of the cryogenic liquid due to bubble formation. The boiling and spreading rates of LPG were found to be the same as those of pure propane. An LPG spill was characterized by the very rapid and violent initial boiling and highly irregular ice formation on the water surface. The measured local boil-off rates of LPG agreed well with theoretical predictions from a moving-boundary heat-transfer model. The spreading velocity of an LPG spill was found to be slightly less than predicted by the spreading model as the rough ice formed on the surface impeded the flow of the LPG.

21867 **Laboratory study of sulfuric acid spill characteristics pertaining to maritime accidents.** Tang, I.N. (Brookhaven National Lab., Upton, NY); Wong, W.T.; Munkelwitz, H.R.; Flessner, M.F. *Environmental Science and Technology;* **16**: No. 9, 587-593(Sep 1982).

Concentrated sulfuric acid and oleums are routinely transported in bulk quantities on U.S. and international waterways. It is conceivable that, in the event of an accident, an acid spill could occur with consequences detrimental to both man and the environment. In the present paper, several acid-spill scenarios are briefly described, and the results from laboratory experiments designed to simulate the two most important types of acid-spill accidents are reported. In the first case, the convective mixing of concentrated sulfuric acid with water is shown to be governed by the buoyancy force arising from changes in acid concentration and released heat of dilution. In the second case, experiments with oleums have resulted in the formation of dense clouds of acid aerosols well within the respirable particle size range.

21868 **Organic contaminants in groundwater near an underground coal gasification site in northeastern Wyoming.** Stuermer, D.H.; Ng, D.J.; Morris, C.J. (Lawrence Livermore Lab., CA). *Environmental Science and Technology;* **16**: No. 9, 582-587(Sep 1982). Contract W-7405-ENG-48.

Three groundwater samples collected near two underground coal gasification (UCG) sites 15 months after the end of gasification were analyzed for dissolved organic contaminants. The contaminants consisted of phenols, aromatic carboxylic acids, aromatic hydrocarbons, ketones, aldehydes, pyridines, quinolines, isoquinolines, and aromatic amines. Concentrations ranged up to about 50 ppm with large variations both in the relative concentrations of acidic, neutral, and basic constituents and in the concentrations of individual compounds. Naphthalene, o-xylene, 2-methylpyridine, and o-cresol were consistently present in high concentrations and were identified as UCG contaminant-indicator compounds that appear to be particularly useful for monitoring purposes. A simplified method of analysis for these compounds was developed.

21869 **Nature and distribution of organic matter in the surface sediments of world oceans and seas.** Premuzic, E.T.; Benkovitz, C.M.; Gaffney, J.S.; Walsh, J.J. (Brookhaven National Lab., Upton, NY). *Organic Geochemistry;* **4**: 63-77(1982). Contract AC02-76CH00016.

Existing data on the distribution of organic carbon and nitrogen in marine sediments have been analyzed in order to better understand the physical and chemical processes involved in this aspect of the global carbon cycle. Maps of the global distribution of organic carbon and nitrogen in the sediments of world oceans and seas are presented. Correlation analyses of the available information dealing with the distribution of marine sedimentary organic matter have revealed that in terms of bulk parameters (%C/sub Org/ and %N Kjeldahl), there is an apparent accumulation of organic matter on the continental slope (water column depth 200 to 2000 m). Specific interactions between clays and organic matter, although indicated in laboratory experiments, have not been detected by these analyses. 167 references.

5203 Radioactive Materials Monitoring And Transport

REFER ALSO TO CITATION(S) 19819, 19829, 19841, 19852, 19854, 19879, 19881, 19883, 19885, 19886, 19887, 19888, 19889, 21584, 21799, 21832, 21833, 21836, 21839, 21891, 21926, 21993

21870 (ANL/NESC—887) **GETOUT; radionuclide transport geologic media.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Liddell, P.J. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048887.

Maxima of - 88 discharge profiles 51 single chains 26 two-member chains 11 three-member chains;.

GETOUT is a set of four FORTRAN programs and associated subroutines developed as an aid to investigate the migration of radionuclide chains from an underground source. The model to be analyzed is an underground nuclear waste disposal site and a uniform one-dimensional soil column that connects the site with a surface water body. At an arbitrary time after the waste is deposited, the radioactive material is released to an underground aquifer which flows at constant velocity directly through the soil column into the surface water body. The program takes into account the complications introduced by the radioactive decay of first-order chains to produce other species which have different absorption characteristics and, in turn, decay at different rates.UNIVAC1100; FORTRAN; EXEC8; Program ONE requires 29,000 words of main memory and 205,000 words of direct access storage for execution. Programs TWO and THREE require 31,000 words of main memory and 86,000 and 47,000 words of direct access storage, respectively, and program FOUR requires 44,000 words of main memory and an additional 475,000 words of direct access storage for execution.

21871 (ENICO—1116-Suppl.1-12/82) **ICPP effluent monitoring report, December 1982.** Guinn, G.D. (Exxon Nuclear Idaho Co., Inc., Idaho Falls (USA)). Feb 1983. Contract AC07-79ID01675. 54p. NTIS, PC A04/MF A01. Order Number DE83008317.

A summary of the effluent monitoring program for December 1982 is presented. A summary of the total airborne, liquid and solid releases to date for CY-1982 is shown graphically. The concentration of nuclides released for December and CY-82 to date are tabulated and compared to the applicable DOE Radiation Concentration Guide (DOE 5480.1, Chapter XI, Attachment XI-1, Table II, Column 2). During December there were two inadvertent releases caused by accidental diversions of waste water. These releases resulted in large increases in SR-90 in service waste system. The concentration exceeded the RCG level for the month, but did not cause the annual average to exceed the RCG, which is an annual average release limit. The nonradioactive releases to the injection well during CY-1982 are tabulated. These nonradioactive releases are divided into four categories: inorganic chemicals, ions, organics, and water quality parameters.

21872 (INIS-mf—7499, pp vp) **Problems of assessing increased radon level in drinking water.** Vlcek, J.; Rohacek, J. (Krajska Hygienicka Stanice, Hradec Kralove (Czechoslovakia)); Kunc, E. (Institut Hygieny a Epidemiologie, Prague (Czechoslovakia). Ustav Hygieny Zareni). 1980. (In Czech).

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

Published in summary form only.

21873 (INIS-mf—7500, pp v) **Variability of values of gross volume beta activity in natural waters containing ^{226}Ra and Usub(nat).** Pazdernik, J. (Vyzkumny Ustav Vodohospodarsky, Prague (Czechoslovakia)). [nd]. .

From 6. Czechoslovak spectroscopic conference; Nitra, Czechoslovakia (1 Sep 1980).

Published in summary form only.

21874 (NUREG—0868) **A collection of mathematical models for dispersion in surface water and groundwater.** Codell, R.B.; Key, K.T.; Whelan, G. (Nuclear Regulatory Commission, Washington, DC (USA)). Jun 1982. 280p. NTIS, PC A13/MF A01.

This report represents a collection of some of the manual procedures and simple computer programs used by the Hydrologic Engineering Section of the Division of Engineering, Office of Nuclear Reactor Regulation, for computing the fate of routinely or accidentally released radionuclides in surface water and groundwater. All models are straightforward simulations of dispersion with constant coefficients in simple geometries.

21875 **Four-year declines in radiocesium concentrations of American coots inhabiting a nuclear reactor cooling reservoir.** Brisbin, I.L. Jr.; Vargo, M.J. (Savannah River Ecology Lab., Aiken, SC (USA)). *Health Physics;* **43**: No. 2, 266-269(Aug 1982).

It was established that the amount of radioactive cesium in migratory waterfowl inhabiting a reactor cooling reservoir in South Carolina increased significantly between Sept - Dec 1971. A systematic resampling of the coots was undertaken during 1975-76 to determine changes in contamination levels over the intervening 4 yrs. Ducks were sampled, from the 3 arms of the reservoir each of which received different amounts of effluent. Factors affecting the radiocesium concentration were location, month and year of sampling. The spatial pattern of radiocesium distribution between coots from the 3 arms did not change over the 4 yrs period. There were indications that the radiocesium content decreased proportionally in coots from all 3 areas over the 4 yr period.

5204 Thermal Effluents Monitoring And Transport

REFER ALSO TO CITATION(S) 20306, 21986

21876 (NUREG/CR—2727-V1) **Ecological studies of wood-boring bivalves in the vicinity of the Oyster Creek Nuclear Generating Station. Progress report Sep-Nov 81.** Hoagland, K.E.; Crocket, L. (Lehigh Univ., Stone Harbor, NJ (USA). Wetlands Inst.). Jun 1982. 46p. NTIS, PC A03/MF A01.

The species composition, distribution, and population dynamics of wood-boring bivalves are being studied in the vicinity of the Oyster Creek Nuclear Generating Station, Barnegat Bay, New Jersey. Untreated wood test panels are used to collect organisms at 12 stations. Physiological tolerances of 3 species are also under investigation in the laboratory. Competition among the species is being analyzed. In the fall of 1981, Teredo bartschi remained in Oyster Creek despite continuous prolonged outages of the Oyster Creek Nuclear Generating Station.

5205 Site Resource And Use Studies

REFER ALSO TO CITATION(S) 19599, 19603, 19859, 19860, 19959, 20266, 20280

21877 (CNEN-RT/BIO—80/14) **Proposed classification of biotapological marine ecosystems off the coast of Italy. Part I.** Zurlini, G.; Bruschi, A.; Papucci, C.; Brondi, A. (Comitato Nazionale per l'Energia Nucleare, Rome (Italy). Direzione Centrale della Sicurezza Nucleare e della Protezione Sanitaria; Comitato Nazionale per l'Energia Nucleare, Fiascherino (Italy). Dipartimento Radiazioni e Ricerche di Sicurezza e Protezione; Comitato Nazionale per l'Energia Nucleare, Casaccia (Italy). Dipartimento Radiazioni e Ricerche di Sicurezza e Protezione). Dec 1980. 78p. (In Italian). Dep. NTIS (US Sales Only), MF A01. Order Number DE82902805.

The programming of environmental surveys represents the stage which mostly determines the reliability and representativity of results. A rational choice of the criteria of intervention as well as a suitable schedule of the operations must necessarily be supported with an adequate environmental understanding of the area taken in consideration. The risk involved by a lack of a good knowledge of the environment can be so far represented by redundancies and gaps of information provided by the surveys. One of the aspects to be mainly considered is the multiplicity of the marine environments occurring along the Italian coasts. Each marine environment shows features which, though specific, can be nevertheless classified into certain types. There are good reasons to believe that the problems raised by the marine contamination can have significative analogies within each environmental type. The aim of the biotapological classification of the coastal marine environments, herein proposed, is to allow, with a sufficiently wide grid, the identification of the main environmental types either by establishing a theoretical macrohabitat classification system, or by verifying the possibility of extrapolations from areas where a greater number of environmental informations is available.

21878 (PB—82-229550) **A study of the spatial variations in the non-tidal currents of the Upper Chesapeake Bay. Final report.** Grano, V.; Pritchard, D.W. (Johns Hopkins Univ., Shady Side, MD (USA). Chesapeake Bay Inst.). Jan 1982. 338p. NTIS, PC A15/MF A01.

Time series measurements were conducted of current velocity in order to develop the capability to predict currents from easily measured quantities (tidal heights, wind, atmospheric pressure), measurements were obtained from in situ recording cross-sections in the Upper Chesapeake Bay. During each one-month experimental period, 19 to 28 current meters were distributed on two of the four cross-sections to measure current velocity. Temperature, conductivity, salinity, fresh water inflow to the area, wind, and tidal heights data also were obtained. The study produced information on the spatial variations in the residual or non-tidal currents of the Upper Bay and related these variations to river inflow, density distribution, and wind velocity, both near-field and far-field.

21879 (PB—82-230772) **Lower Susquehanna River hydrographic and water quality study, Summer 1981: Volume I. Final report.** Potera, G.T.; Philipp, K.R.; Johnson, T.D.; Petrimoulx, H.J.; Klose, P.N. (Environmental Resources Management, Inc., West Chester, PA (USA)). 17 Mar 1982. 100p. NTIS, PC A05/MF A01.

This report presents a summary of field data collected for modeling simulations of the Susquehanna River. The modeling simulations are intended to provide information about the relationship of dissolved oxygen (DO) in the Conowingo Reservoir, and in the lower Susquehanna River, to the operation mode of the Conowingo Dam, in order to meet requirements of the operating license issued by the Federal Energy Regulatory Commission. The study objectives were to: (1) monitor water flow and DO flux in the Conowingo Reservoir, in the vicinity of Conowingo Dam and in the river downstream; (2) monitor wind-induced turnover events in the reservoir; (3) measure the effects of specific test discharges by the dam on local water flow characteristics, using current meter and dye measurements; (4) measure the flow characteristics of the river below the dam during unsteady flow conditions and during tests of feasible minimum discharges; and, (5) measure reaeration of the reservoir due to atmospheric oxygen diffusion.

21880 (PB—82-230780) **Lower Susquehanna River hydrographic and water quality study, Summer 1981. Volume 2: appendices. Final report.** Potera, G.T.; Philipp, K.R.; Johnson, T.D.; Petrimoulx, H.J.; Klose, P.N. (Environmental Resources Management, Inc., West Chester, PA (USA)). 17 Mar 1982. 112p. NTIS, PC A06/MF A01.

This report includes appendices to Volume 1, which presents field data on temperature and dissolved oxygen of the Conowingo Dam and the Conowingo Reservoir for use as input to modeling simulations of the Susquehanna River. The modeling simulations were designed to meet requirements of the operating license for Conowingo Dam issued by the Federal Energy Regulatory Commission. Appendices included are: (1) instrument specifications; (2) dye study: time of travel results; (3) dye study: nearfield study results - discrete releases; (4) dye study: nearfield study results - daily summaries; and (5) reaeration data.

21881 (PB—82-237199) **Characterization of LaVerkin Springs water and methods for its reuse in energy development.** Eisenhauer, R.J. (Bureau of Reclamation, Denver, CO (USA). Engineering and Research Center). Nov 1981. 23p. NTIS, PC A02/MF A01.

Analytical water data obtained from a 9-month test program at the LVS (LaVerkin Springs) site, which is located in Washington County, Southwestern Utah, were evaluated. Fresh water and the water after processing through various pretreatment steps and after ED (electrodialysis) desalting were characterized. Upgrading water quality by various physical and chemical treatment methods and by desalting processes was demonstrated by the LVS site test program. The relative merit of different methods of treatment, disposal, and reuse of LVS water were studied. The objectives of the study were to evaluate methods for preventing high salinity LVS water from entering the Virginia River and for utilizing the processed water in energy development. The disposal of water by (1) deep well injection, (2) use as a secondary coolant in a binary cooling tower, (3) use in solar salt-gradient ponds, and (4) use as a transport media for coal slurry pipelines were found to be technically feasible. Use of LVS water to transport coal to a consuming powerplant and subsequent reuse in a binary cooling tower and/or solar salt-gradient ponds would achieve both objectives of salt reduction and energy conservation. Because LVS water has a salt content of 9500 mg/L and a boron content of 5 mg/L, it cannot be directly used for irrigation.

21882 (PB—82-239716) **Two level multi-objective reconnaissance system study of a large water resource system. Doctoral thesis.** Chaube, U.C. (Indian Inst. of Tech., New Delhi). 1982. 295p. NTIS, PC A13/MF A01.

Reconnaissance study of a large water resource system involves analysis of subsystem characteristics and subsystem interlinkages in terms of total system development objectives. Linear optimization models are developed to represent, (a) aggregate temporal and spatial characteristics of the system (b) predominant policies namely irrigation and energy development and (c) the related issues and technological options, in physical terms. A large system is viewed in terms of several constituent subsystems in which Level-I study relates to irrigation and energy development. These Level-I and Level-II studies have been carried out in the context of developmental planning of Ganga basin. The basin is characterized by predominant agriculture based economy and temporal and regional heterogeneity in the resource availability and demand pattern. The study brings out relative impact of various issues on the irrigation and energy policies in planning subregions and trade-offs which would form the basis of further creative development and detailed systems analysis.

21883 (TVA/OECD/FPM—83/27) **Floods on North Toe River and Kentucky Creek in the vicinity of Newland, North Carolina. Flood report.** (Tennessee Valley Authority, Knoxville (USA). Office of Economic and Community Development). Dec 1982. 41p. NTIS, PC A03/MF A01. Order Number DE83901236.

This study provides floodplain information for the North Toe River and Kentucky Creek in the vicinity of Newland, North Carolina. The study was requested by the town of Newland to provide information reflecting current flood conditions in order for the town to better administer its floodplain management program. This investigation covers the North Toe River through the corporate limits of Newland from river mile 69.12 to mile 70.56 and Kentucky Creek from its mouth upstream to mile 0.53. A brief description of the North Toe River watershed and a flood history of Newland are included. Selected flood profiles and 100- and 500-year floodplain delineations for the streams studied are also provided. A proposed 100-year floodway is included as an appendix.

5206 Regulations

REFER ALSO TO CITATION(S) 21818

21884 **(PB—82-243601) UV disinfection for onsite sand filter effluent.** Lowery, J.D.; Romatzick, S. (Maine Univ., Orono (USA). Land and Water Resources Center). May 1982. 40p. NTIS, PC A03/MF A01.

The technical and economic feasibility of using ultraviolet (uv) light as a viable alternative to chlorine as the required disinfectant for onsite sand filter effluents discharged to surface waters in Maine was determined. To obtain a reliable cross section of performance for sand filters in Maine, 74 filters were selected for an effluent characterization program. The effluent characterization study allowed general conclusions to be made with regard to the potential of uv disinfection. A simple suspended lamp uv disinfection unit was designed, constructed, and tested in the laboratory and in the field. The efficiency of the uv disinfection unit was determined through field testing at 10 of the 74 sand filter sites used in the effluent characterization program.

53 ENVIRONMENTAL-SOCIAL ASPECTS OF ENERGY TECHNOLOGIES

5301 Social And Economic Studies

REFER ALSO TO CITATION(S) 19599, 19657, 19859, 19860, 19879, 19880, 20774

21885 **(CONF-8209104—1) Management of social effects in oil-shale boomtowns.** Wernette, D. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 38p. NTIS, PC A03/MF A01. Order Number DE83007961.

From Annual meeting of the American Sociological Association; San Francisco, CA, USA (6 Sep 1982).

Concern with energy developments in rural sparsely populated areas has concentrated on two types of impacts: the increased employment of local workers, and the social and fiscal problems caused by rapid population growth due to in-migrant workers. Little work has been done to date to estimate the effectiveness of measures to manage these impacts to the benefit of the local population. Sensitivity analysis with a county-level computer simulation model is used to estimate the effectiveness of four growth management measures in this study. Two scenarios of oil-shale development in northwestern Colorado are used as the context for these measures. The two measures to increase local employment focus on training local workers in relevant skills, and on increasing the commuting of workers from adjacent counties. Neither of these measures has large effects on local employment because of the limited pool of local labor. The two measures to control population growth focus on reducing secondary local employment growth and lowering the average size of in-migrant workers' households. Neither of these measures produce large reductions in the rate of population growth. The construction of a new community appears more promising as an impact mitigation measure. These findings are limited in validity to very high growth scenarios for very isolated, sparsely populated areas. These growth management measures should be of greater value for lower growth scenarios and for more densely populated areas of the country.

21886 **(PB—82-206962) General design study of pilot VOC control units.** Henke, C.B.; Key, J.A.; Parmele, C.S.; Basdekis, H.S. (IT-Enviroscience, Knoxville, TN (USA)). Apr 1981. 85p. NTIS, PC A05/MF A01.

The Industrial Environmental Research Laboratory (IERL), in support of the Office of Air Quality Planning and Standards Volatile Organic Compounds (VOC) Program, has established a project for design, construction and operation of four pilot emission control units which will be transportable and represent state-of-the-art technology. The control technologies represented in the pilot systems will be (1) carbon adsorption with regeneration, (2) thermal incineration with heat recovery, (3) catalytic incineration with heat recovery, and (4) condensation. It is anticipated that the four systems will be used on actual VOC emissions from industrial processes for definition of control VOC emissions from industrial processes for definition of control feasibility, efficiencies, and to provide data for system scale-up. Since existing designs for small adsorption or incineration systems are not flexible enough to meet the needs of these applications, the pilot systems will be designed to meet the specifications outlined in this report. The designs for these pilot systems include provisions for collecting all of the data necessary to evaluate the performance of the system and to provide a sound design basis for a full-scale system.

21887 **(PB—83-105387) Social, economic and environmental effects of rising timber prices. Final report.** McKillop, W.; Adams, D.; Haynes, R.; Geissler, P. (Forest Service, Berkeley, CA (USA). Pacific Southwest Forest and Range Experiment Station). 25 Mar 1981. 97p. NTIS, PC A05/MF A01.

The effects of rising relative (real) prices for softwood lumber and plywood were estimated using analysis of supply and demand with prices stabilized at their 1977 level. Estimates were developed for the target years 1990, 2000, 2010, 2020, and 2030. The 'stable price' analysis revealed the combined effect, at the national level, of shifts in demand and supply schedules over the 1977-2030 period. Effects were estimated for lumber, log and plywood output and consumption.

5302 Assessment Of Energy Technologies

REFER ALSO TO CITATION(S) 21820

21888 **(GAO/RCED—83-38) Environmental and socioeconomic status of the Hampshire energy project.** (General Accounting Office, Washington, DC (USA). Resources, Community and Economic Development Div.). 22 Oct 1982. 28p. General Accounting Office, P.O. Box 6015, Gaithersburg, MD 20760.

Report to The Chairman, Subcommittee on Environment, Energy, and Natural Resources, Committee on Government Operations, House of Representatives.

The Synthetic Fuels Corporation has conditionally advanced the Hampshire Energy project to the last stage of its project evaluation process - final financial assistance negotiations. The advancement was contingent on Hampshire's receiving all the necessary environmental and socioeconomic permits required to begin construction in the spring of 1983. Hampshire has filed applications with State of Wyoming permitting agencies for the key pre-construction permits. However, as of October 12, 1982, no permits had been granted.

21889 **(NP—3901689) Quantification of environmental costs and benefits study module VI. Final report.** (Nero and Associates, Inc., Portland, OR (USA)). Sep 1982. 67p. NTIS, PC A04/MF A01. Order Number DE83901689.

This study attempts to develop methodology for quantifying environmental costs and benefits. (PSB)

21890 **(ORNL/SUB—82-22268/1) Federal role and activities in energy research and development 1946-1980: an historical summary.** Hewlett, R.G.; Dierenfield, B.J. (History Associates, Inc., Gaithersburg, MD (USA)). Feb 1983. Contract W-7405-ENG-26. 181p. NTIS, PC A09/MF A01. Order Number DE83007179.

The federal role in energy research and development has changed substantially in the three decades since World War II. In nuclear technology, the federal presence shifted from government monopoly in the 1940s and early 1950s, to a lesser federal role in the mid-1950s, as the private sector commercialized nuclear power, to an increasing federal role in the 1960s, but now focused on the breeder reactor as a long-term option. Conventional fuel technologies such as coal and oil enjoyed only modest federal support in the immediate postwar years, with only slow increases before 1974. Renewable energy technologies have received substantial federal support only since 1973.

5303 Environmental Impact Statements

REFER ALSO TO CITATION(S) 19730, 21817

21891 **(DOE/EIS—0089D) Operation of PUREX and uranium oxide plant facilities, Hanford Site, Richland, Washington. Draft environmental impact statement.** (USDOE, Washington, DC). May 1982. 251p. NTIS, PC A12/MF A01. Order Number DE83008561.

This is an environmental impact statement (EIS) on the resumption of irradiated fuel processing at the PUREX/UO facilities located at the Hanford Site, near the Tri-Cities (Richland, Kennewick and Pasco) in southeastern Washington. This EIS describes the proposed action (resumption of chemical processing in the PUREX/UO_3 facilities in FY 1984), the reasonable alternatives, and the potential environmental consequences of teh proposed action and the alternatives. The environmental consequences of the proposed action and the three alternatives are described in detail. They include: normal operational impacts on workers, the general public, air quality, and water quality; abnormal operational impacts; onsite and offsite transportation aspects of radiation exposure from normal conditions and accidents; construction impacts; and, socioeconomic impacts from operational and construction activities.

21892 **(NP—3901052) Final Regional Environmental Impact Statement. Volume 2.** (Minerals Management Service, Metairie, LA (USA). Gulf of Mexico OCS Region). Jan 1983. 488p. NTIS (US Sales Only).

This document evaluates potential impacts from all Gulf of Mexico sales including the 11 shown in the proposed final five-year leasing schedule, and to estimates the cumulative impacts of developing all currently known estimates of oil and gas reserves in the Gulf over the life of the resource. Included in the proposed final five-year leasing schedule are 1983 oil and gas lease Sales 72, 74, and 79 in the Central, Western, and Eastern Gulf planning areas. The proposed action for each of these three sales is the offering of all unleased blocks within each planning area for which three separate sale decisions will be made. There are approximately 39 million acres in the Central Gulf (Sale 72), 33 million acres in the Western Gulf (Sale 74), and 58 million acrres in the Eastern Guld (Sale 79) for a total of 130 million acres. Analysis of the environmental and socioeconomic resources/activities of Special concern included consideration of mitigation measures which ould be implemented or invoked as part of the lease sale process. As a result of these and other analyses, as well as considerable consultation and coordination with Fish and Wildlife Service and National Park Service potential special mitigation measures were identified.

21893 **(NP—3901053) Final regional environmental impact statement. Volume 1. Gulf of Mexico.** (Minerals Management Service, Metairie, LA (USA). Gulf of Mexico OCS Region). Jan 1983. 939p. NTIS.

This document evaluates potential impacts from all Gulf of Mexico sales including the 11 shown in the proposed final five-year leasing schedule, and estimates the cumulative impacts of developing all currently known estimates of oil and gas reserves in the Gulf over the life of the resource. Included in the proposed final five-year leasing schedule are 1983 oil and gas lease Sales 72, 74, and 79 in the Central, Western, and Eastern Gulf planning areas. The proposed action for each of these three sales is the offering of all unleased blocks within each planning area for which three separate sale decisions will be made. There are approximately 39 million acres in the Central Gulf (Sale 72), 33 million acres in the Western Gulf (Sale 74), and 58 million acres in the Eastern Gulf (Sale 79) for a total of 130 million acres. Analysis of the environmental and socioeconomic resources/activities of Special Concern included consideration of mitigation measures which could be implemented or invoked as part of the lease sale process. As a result of these and other analyses, as well as considerable consultation and coordination with Fish and Wildlife Service and National Park Service potential special mitigation measures were identified.

55 BIOMEDICAL SCIENCES, BASIC STUDIES

21894 **SSAM: solid-state automated microscope.** Young, I.T. (Technical Univ., Delft, Netherlands); Balasubramanian; Dunbar, D.L.; Peverini, R.L.; Bishop, R.P. *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Bio-Medical Engineering;* **BME-29**: No. 2, 70-82(Feb 1982). Contract W-7405-ENG-48.

A new microscope system that is designed to provide images for a computer has been built and tested. This system differs from previous computerized microscopes in that the fundamental design parameters have been tuned to the computer as the receiver of the image instead of the human visual system. This solid-state automated microscope system (SSAM) simultaneously provides wide-field (2 mm), high-resolution (0.5 μ), high signal-to-noise images (> 53 dB) at data rates of 5 x 10^6 pixels/s. Various methods have been developed and used to test the design specifications of the system against the actual performance.

5501 Behavioral Biology

21895 **A population model of the lizard Uta stansburiana in southern Nevada.** Turner, F.B.; Medica, P.A.; Bridges, K.W.; Jennrich, R.I. (Univ. of California, Los Angeles). *Ecological Monographs;* **52**: No. 3, 243-259(1982). Contract AC03-76SF00012.

Population densities, reproduction, and survival of the lizard Uta stansburiana were measured at the Nevada Test Site in southern Nevada, USA, between 1964 and 1974. These data were used to develop a model of the population dynamics of this species. Results of irrigation experiments in 0.4-ha enclosures near Mercury, Nevada, were used to formulate multiple-regression equations predicting frequency and size of clutches laid by two age-classes of females in terms of winter rainfall, March air temperatures and Uta population density. Densities of Uta in these enclosures were manipulated, and age-specific survival modeled in terms of spring densities of Uta. Experiments in which an important predator on Uta (the leopard lizard, Crotaphytus wislizeni) was removed from enclosures were used to estimate the influence of the predator on basic survival rates of hatchling and older Uta. The model was generally developed from data acquired in the small enclosures, but predictions were compared with actual observations of changes in Uta populations in Rock Valley (19 km west of Mercury, Nevada) between 1966 and 1972. The basic model included three density-dependent parameters: clutch frequency, clutch size, and adult survival. It was concluded that processes relating to egg production were modeled more effectively than those influencing survival, and that improvement of the model will depend on more detailed studies of the impact of predation on age-specific survival rates of Uta.

5502 Biochemistry

REFER ALSO TO CITATION(S) 19922, 21914

21896 (BNL—32266) Facility for in-vivo measurement of lithium. Vartsky, D.; Wielopolski, L.; Ellis, K.J.; Cohn, S.H. (Brookhaven National Lab., Upton, NY (USA)). 1982. Contract AC02-76CH00016. 5p. (CONF-8210106—3). NTIS, PC A02/MF A01. Order Number DE83007388.

From Workshop on uses of nuclear analytical methods in metal toxicology; Upton, NY, USA (11 Oct 1982).

Although lithium, an alkali metal is found in trace quantities in human, animal and plant tissue, no essential function has yet been ascribed to it. The concentration of Li in normal human tissue is in the 0.01 μg/g range, being largest in the cortical bone - 0.12 μg/g. Lithium was first used clinically for the treatment of mania. The most important clinical effect today is the prophylactic action or its ability to attenuate or prevent recurrences of manic and depressive episodes. While the absorption and excretion of Li have been studied, little is known about the distribution of Li between plasma and tissues. Li does not have a radioactive isotope which will permit these studies. Knowledge of the concentration of Li in a given tissue appears to be essential for understanding of the action of Li. Several studies in animals and postmortem specimens have been performed in vitro. This paper presents a method for in-vivo measurement of Li levels in human brain and other organs of interest such as the kidney.

21897 (CONF-8210129—1) Introduction to high-resolution two-dimensional electrophoresis in clinical chemistry. Anderson, N.G. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 5p. NTIS, PC A02/MF A01. Order Number DE83007662.

From Colloquium on perspective biology; Nancy, France (3 Oct 1982).

The complex array of reactions and processes involving proteins occurring in healthy and diseased human cells was explored to develop analytical and preparative systems which allow separation, detection, and quantitative analysis of nearly all proteins in human cells and body fluids. (PSB)

21898 (NP—3900729) Annual report, July 1981-June 1982. (Academia Sinica, Taipei (Taiwan). Inst. of Botany). 1982. 44p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83900729.

Research programs conducted from July 1981 to June 1982 are briefly described. Subject areas include allelopathy of selected grasses and trees, cultivation techniques of rice, antibiotics, mycology, recombinant DNA technology, and photosynthesis. (ACR)

21899 (ORNL/EIS—163-Vol.5-Pt.1) Chemicals identified in human biological media: a data base. Fourth annual report, October 1982. Cone, M.V.; Baldauf, M.F.; Opresko, D.M.; Uziel, M.S. (comps.). (Oak Ridge National Lab., TN (USA)). Dec 1982. Contract W-7405-ENG-26. 345p. (EPA—560/5-82-003A). NTIS (US Sales Only). Order Number DE83006367.

A comprehensive data base of chemicals identified in human biological media (tissues and body fluids) has been established. This two-part volume is the annual publication of the data base for 1982. Data were obtained primarily from the open literature through manual searches (retrospective to 1974. The data base now contains information on over 1000 different substances, all of which are listed by Chemical Abstracts Service (CAS) preferred names. The data base is published annually in tabular format with indices and chemical listings that allow specific searching. The purpose of the data base is to provide a centralized resource of body-burden data, and in no way is it intended to obviate the need for the user to ultimately refer to the original literature or data source.

21900 (ORNL/EIS—163-Vol.5-Pt.2) Chemicals identified in human biological media: a data base. Fourth annual report. Cone, M.V.; Baldauf, M.F.; Opresko, D.M.; Uziel, M.S. (comps.). (Oak Ridge National Lab., TN (USA)). Oct 1982. Contract W-7405-ENG-26. 480p. (EPA—56015-82-003B). NTIS, PC A21/MF A01. Order Number DE83006369.

A comprehensive data base of chemicals identified in human biological media (tissues and body fluids) has been established. This two-part volume is the annual publication of the data base for 1982. Data were obtained primarily from the open literature through manual searches (retrospective to 1974). The data base now contains information on over 1000 different substances, all of which are listed by Chemical Abstracts Service (CAS) preferred names. The data base is published annually in tabular format with indices and chemical listings that allow specific searching. The purpose of the data base is to provide a centralized resource of body-burden data, and in no way is it intended to obviate the need for the user to ultimately refer to the original literature or data source.

21901 New developments in on-line isoenzyme monitoring for use in clinical diagnostics. Bostick, W.D.; Denton, M.S.; Dinsmore, S.R. (Oak Ridge National Lab., TN). pp 111-134 of Biological/biomedical applications of liquid chromatography III. Hawk, G.L. (ed.). New York, NY; Marcel Dekker, Inc. (1981).

Preliminary data are presented describing systems for the selective, on-line detection of isoenzymes in chromatographic column effluents. The creatine kinase reaction product, ATP, may be monitored by the overall firefly bioluminescence reaction: ATP + luciferin /sup luciferase//sub Mg^{2+}/ → adenyl luciferin and adenyl luciferin + 02 → adenyl oxyluciferin + light. The reaction produces its own light emission; therefore, no external source is required and there is no nonspecfic background signal to require referencing. In addition, the use of a flow-through electrochemical cell substituted for an enzymatic microreactor in the continuously referenced detection of LD isoenzymes is described. Half of the effluent stream, containing NADH reaction product, passes through a reticulated vitreous carbon electrode, poised at +0.75 to +0.95 V (vs Ag/AgCl), while half passes through a matched-flow "dummy" side with no applied potential. A reproducible portion of the NADH (e.g., ≧70%) in the active side is reoxidized to NAD, thus producing a difference in optical signal between the sample and reference cells of a spectrophotometer monitoring 340 nm. (JMT)

21902 Correlation between photosynthesis and the transthylakoid proton gradient. Slovacek, R.E.; Hind, G. (Brookhaven National Lab., Upton, NY). *Biochimica et Biophysica Acta;* **635**: 393-404(1981). Contract AC02-76CH00016.

In isolated intact chloroplasts, maximal rates of photosynthetic O_2 evolution (in saturating $HCO^-{}_3$) are associated with a critical transthylakoid proton gradient as a result of the stoichiometric consumption of 2 mol NADPH and 3 mol ATP/mol CO_2 fixed. Studies with the fluorescent probe 9-aminoacridine reveal that in the illuminated steady state the critical ΔpH is 3.9. CO_2-dependent O_2 evolution is inhibited by increases of 0.1 to 0.2 in ΔpH that occur when catalase is omitted from the medium, $NO^-{}_2$ is included as an electron acceptor, or when chloroplasts are illuminated under low partial pressures of O_2. Low concentrations of antimycin (0.33 μM) or NH_4Cl (0.33 mM) decrease ΔpH and relieve this inhibition of electron flow. The energy transfer inhibitor quercetin lowers the high ATP/ADP ratio associated with these conditions, but does not lower ΔpH or relieve the inhibition. A decrease of ΔpH below 3.9 by weaker illumination, millimolar levels of NH_4Cl or micromolar levels of antimycin, results in lower rates of photosynthesis owing to limitation by the phosphorylation rate. These findings show that in absence of rate limitation by the carbon cycle, the extent of thylakoid energization is related to the ratio of ATP to NADPH production and in turn, the rate of CO_2 assimilation.

21903 Structure of bisadeninium dinitrate monohydrate, $(C_5H_6N_5{}^+.NO_3{}^-)_2.H_2O$. Hingerty, B.E.; Einstein, J.R.; Wei, C.H. (Oak Ridge National Lab., TN). *Acta Crystallographica;* **B37**: 140-147(1981).

The title compound, $(C_5H_6N_5{}^+.NO_3{}^-)_2.H_2O$, is monoclinic, $P2_1/m$, with a = 11.705 (2), b = 6.363 (1), c = 11.280 (1) A, β = 104.241 (6)°; Z = 2; D/sub calc/ = 1.690, D/sub obs/ = 1.70 (2) Mg m^{-3}. The structure was refined by a full-matrix least-squares method to R(F) = 0.035 for 1494 nonzero counter data to 0.84 A. Analytical absorption and isotropic extinction corrections were applied. All hydrogen atoms were located and refined isotropically. E.s.d.'s of bond lengths and bond angles involving C, N, O atoms are 0.002 A and 0.2°. The bases, and some of the other atoms, lie in the mirror planes at y = 1/4 and 3/4. The two independent adeninium ions are both protonated at N(1), and are part of an infinite hydrogen-bonded chain in the a direction. The bases are paired through hydrogen bonds, N(9)H ... N(3) and N(6)H ... N(7), where N(6) is the exocyclic amino nitrogen, as found in some other adenine salts, in some oligonucleotides, and in the acid form of polyadenylic acid. Tautomerism was found to involve the hydrogen atoms of the N(9)H ... N(3) bonds, with N(9) ... HN(3) in 20% of the sites. Base stacking occurs between one of the two adeninium ions and its screw-related partners.

5503 Cytology

REFER ALSO TO CITATION(S) 22011

21904 **(LA-UR—83-420) Molecular mechanisms of intercellular communication: transmembrane signaling.** Bitensky, M.W.; George, J.S.; Siegel, H.N.; McGregor, D.M. (Los Alamos National Lab., NM (USA)). 1982. Contract W-7405-ENG-36. 17p. (CONF-8205162—1). NTIS, PC A02/MF A01. Order Number DE83007559.

From Conference on mononuclear phagocyte biology; Wilmington, NC, USA (17 May 1982).

This short discussion of transmembrane signaling depicts a particular class of signaling devices whose functional characteristics may well be representative of broader classes of membrane switches. These multicomponent aggregates are characterized by tight organization of interacting components which function by conformational interactions to provide sensitive, amplified, rapid, and modulated responses. It is clear that the essential role of such switches in cell-cell interactions necessitated their appearance early in the history of the development of multicellular organisms. It also seems clear that once such devices made their appearance, the conformationally interactive moieties were firmly locked into a regulatory relationship. Since modification of interacting components could perturb or interfere with the functional integrity of the whole switch, genetic drift was only permitted at the input and outflow extremes. However, the GTP binding moiety and its interacting protein domains on contiguous portions of the receptor and readout components were highly conserved. The observed stringent evolutionary conservation of the molecular features of these membrane switches thus applies primarily to the central (GTP binding) elements. An extraordinary degree of variation was permitted within the domains of signal recognition and enzymatic output. Thus, time and evolution have adapted the central logic of the regulatory algorithm to serve a great variety of cellular purposes and to recognize a great variety of chemical and physical signals. This is exemplified by the richness of the hormonal and cellular dialogues found in primates such as man. Here the wealth of intercellular communiation can support the composition and performance of symphonies and the study of cellular immunology.

21905 **X-ray diffraction and electron microscope study of phase separation in rod outer segment photoreceptor membrane multilayers.** Gruner, S.M. (Princeton Univ., NJ); Rothschild, K.J.; Clark, N.A. *Biophysical Journal;* **39**: No. 3, 241-251(Sep 1982). Contract AC02-76EV03120.

Phase separation in artificially stacked multilayers of isolated bovine retinal rod outer segment (ROS) membranes has been examined via x-ray diffraction and electron microscopy. Specimens were prepared by isopotential spin drying followed with partial hydration by equilibration against moist gas streams. Upon dehydration, the multilamellar membrane phase assumes a binary phase composition consisting of concentrated protein-containing lamellae interspersed with microdomains of hexagonally packed tubes of lipid in a H/sub II/ configuration. The H/sub II/ lattice is geometrically coupled to the lamellar phase with one set of hexagonal crystal planes co-planar to the local membrane lamellae. The hexagonal microdomains bear a striking resemblance to the "paracrystalline inclusions" observed in fast-frozen, intact frog ROS (Corless and Costello, 1981. Exp. Eye Res. 32:217). The lamellar lattice is characterized by an unusually small degree of disorder. Sharp lamellar diffraction with a 120 angstrom unit cell is observed (at near total dehydration) to a resolution of 6 angstrom. A model consistent with the data is that a multilamellar array of ROS disks is stable as long as the external disk surfaces are kept sufficiently far apart. If the distance between the membranes is allowed to shrink below a certain critical value, the disk lipids, spontaneously convert to a nonbilayer phase. This suggests that the structure of the ROS is stabilized by an internal framework that acts to keep the disks apart from one another and from the plasmalemma. Thus, necessity of avoiding phase separations may provide a rationale for the peculiar morphology of the ROS.

21906 **Temperature dependence of the yield shear resultant and the plastic viscosity coefficient of erythrocyte membrane: implications about molecular events during membrane failure.** Waugh, R.E. (Univ. of Rochester, NY). *Biophysical Journal;* **39**: No. 3, 273-278(Sep 1982).

Structural failure of the erythrocyte membrane in shear deformation occurs when the maximum shear resultant (force/length) exceeds a critical value, the yield shear resultant. When the yield shear resultant is exceeded, the membrane flows with a rate of deformation characterized by the plastic viscosity coefficient. The temperature dependence of the yield shear resultant and the plastic viscosity coefficient have been measured over the temperature range of 10-40°C. Over this range the yield shear resultant does not change significantly (+/- 15%), but the plastic viscosity coefficient changes exponentially from a value of 1.3×10^{-2} surface poise (dyn s/cm) at 10°C to a value of 6.2×10^{-4} surface poise (SP) at 40°C. The different temperature dependence of these two parameters is not surprising, inasmuch as they characterize different molecular events. The yield shear resultant depends on the number and strength of intermolecular connections within the membrane skeleton, whereas the plastic viscosity depends on the frictional interactions between molecular segments as they move past one another in the flowing surface. From the temperature dependence of the plastic viscosity, a temperature-viscosity coefficient, E, can be calculated: n/sub p/ = constant x exp(-E/RT). This quantity (E) is related to the probability that a molecular segment can "jump" to its next location in the flowing network. The temperature-viscosity coefficient for erythrocyte membrane above the elastic limit is calculated to be 18 kcal/mol, which is similar to coefficients for other polymeric materials.

21907 **Lateral diffusion in an archipelago - effects of impermeable patches on diffusion in a cell membrane.** Saxton, M.J. (Univ. of California, Davis). *Biophysical Journal;* **39**: No. 2, 165-173(Aug 1982). Contract AT03-80ER10700.

Lateral diffusion of molecules in lipid bilayer membranes can be hindered by the presence of impermeable domains of gel-phase lipid or of proteins. Effective-medium theory and percolation theory are used to evaluate the effective lateral diffusion constant as a function of the area fraction of fluid-phase lipid and the permeability of the obstructions to the diffusing species. Applications include the estimation of the minimum fraction of fluid lipid needed for bacterial growth, and the enhancement of diffusion-controlled reactions by the channeling effect of solid patches of lipid.

5504 Genetics

REFER ALSO TO CITATION(S) 21914, 21924

21908 **Mating types in screwworm populations.** Richardson, R.H.; Ellison, J.R.; Averhoff, W.W. (Univ. of Texas, Austin). *Science (Washington, D.C.);* **218**: 1142-1145(10 Dec 1982).

Response is given to questions raised by L.E. LaChance, et al., regarding the types of screwworm that occur in Mexico and anatomical differences in male genitalia among types. Errors in chromosome length and arm ratios are discussed. Results of testing the V-81 strain (sterile males) indicate that mating barriers exist even at high release rates. Mating discrimination must be high for a population to withstand an excess of sterile flies. The relevance of this to eradication programs is discussed. (RJC)

5505 Metabolism

REFER ALSO TO CITATION(S) 19920, 19939, 21898, 21913

21909 **(DOE/ER/10902—2) Biochemical and physiological characterization of higher plants with reduced photorespiration. Progress report, March 1, 1982-March 1, 1983.** Chollet, R. (Nebraska Univ., Lincoln (USA)). 1983. Contract AC02-81ER10902. 5p. NTIS, PC A02/MF A01. Order Number DE83007949.

Progress is reported in the following research areas: (1) photosynthetic carbon metabolism in naturally occurring higher plants with reduced photorespiration; and (2) physicochemical analysis of higher plant and bacterial ribulosebiphosphate carboxylase/oxygenase (RuBisCO). (ACR)

21910 **(DOE/ET/12066—1) Carbon metabolism in legume nodules. Progress report, June 1, 1982-January 30, 1983.** LaRue, T.A. (Boyce Thompson Inst. for Plant Research, Ithaca, NY (USA)). Feb 1983. Contract AC02-82ER12066. 5p. NTIS, PC A02/MF A01. Order Number DE83007895.

The oxidation and reduction of flavins and pyridine nucleotides in intact bacteria can be monitored by their changes in fluorescence. This technique permits study in nitrogen fixing bacteria of the effect of inhibitors of electron transport, and of the effect of substrates which may provide reductant for nitrogenase or oxidative phosphorylation. The nitrogen fixing ability of intact legume plants or bacteroids isolated from nodules can be manipulated downward by appropriate brief treatment of supra-optimal oxygen concentrations.

5506 Medicine

REFER ALSO TO CITATION(S) 22525

21911 **(AD-A—116670/1) Determination of material properties by limited scan x-ray tomography. Final technical report Sep 79-Jan 81.** Jarisch, W. (Scientific Systems, Inc., Cambridge, MA (USA)). Sep 1981. 138p. NTIS, PC A07/MF A01.

The purpose of this program was to explore methods of increasing the speed of the computed tomography (C/T) inspection process. The report presents an analysis of a translational data collection scheme and compares that to the tradition rotation data taken when used in most C/T machinery.

21912 **(DOE/EV/02777—T1) Evaluative studies in nuclear medicine research: positron computed tomography assessment. Final report, January 1, 1982-December 31, 1982.** Potchen, E.J.; Harris, G.I.; Gift, D.A. Reinhard, D.K.; Siebert, J.E. (Michigan Research Center, Inc., East Lansing (USA)). Feb 1983. Contract AC02-76EV02777. 87p. NTIS, PC A05/MF A01. Order Number DE83007878.

Results are reported of the final phase of the study effort generally titled Evaluative Studies in Nuclear Medicine Research. The previous work is reviewed and extended to an assessment providing perspectives on medical applications of positron emission tomographic (PET) systems, their technological context, and the related economic and marketing environment. Methodologies developed and used in earlier phases of the study were continued, but specifically extended to include solicitation of opinion from commercial organizations deemed to be potential developers, manufacturers and marketers of PET systems. Several factors which influence the demand for clinical uses of PET are evaluated and discussed. The recent Federal funding of applied research with PET systems is found to be a necessary and encouraging event toward a determination that PET either is a powerful research tool limited to research, or whether it also presents major clinical utility. A comprehensive, updated bibliography of current literature related to the development, applications and economic considerations of PET technology is appended.

21913 **(DOE/EV/04268—T1) Biomedical research with cyclotron-produced radionuclides. Progress report, August 1, 1982-February 28, 1983.** Laughlin, J.S. (Sloan-Kettering Inst. for Cancer Research, New York (USA)). 28 Feb 1983. Contract AC02-77EV04268. 61p. NTIS, PC A04/MF A01. Order Number DE83007979.

Progress in the following research areas is reported: (1) exploratory clinical metabolic studies; (2) compound synthesis labeling and associated biological studies; and (3) data analysis, modeling and instrumentation. (ACR)

21914 **(ORAU—208) Research report 1981-1982.** (Oak Ridge Associated Universities, Inc., TN (USA)). 1982. Contract AC05-76OR00033. 34p. NTIS, PC A03/MF A01. Order Number DE83007708.

This report reviews the past year's achievements, staffing, and programmatic directions. Programs in radiopharmaceutical development, nuclear medicine, biochemistry, epidemiology, cytogenetics, and marmoset research are described. The aim of our research efforts is to solve selected health problems related to respiratory, vascular, and gastrointestinal diseases and various cancers that originate from occupational exposures to chemicals or ionizing radiation as a result of energy production.

21915 **(PB—83-938200) Lung cancer: diagnosis, treatment. Cancergram ct08.** (National Cancer Inst., Bethesda, MD (USA). International Cancer Research Data Bank). 1983. 12 issuesp. Paper copy available on subscription, North American Continent price $30.00/year; all others write for quote. Also available in single copies.

The Cancergram covers clinical aspects of cancers of the lung and tracheo-bronchial tree, i.e., the lower respiratory tract. This includes primary lung cancer in both early and advanced disease states. The topic includes clinically relevant aspects of the prevention, detection, diagnosis, evaluation, and therapy of lung cancer. Certain aspects of metastatic lung disease treatment or therapy which involve aspects of interest to primary lung cancer are included. With certain exceptions, general preclinical or animal studies not directly related to the primary human disease are excluded. Respiratory tract carcinogenesis is covered by Cancergram CK15.

21916 **(PB—83-938300) Breast cancer: diagnosis, treatment, preclinical biology. Cancergram ct09.** (National Cancer Inst., Bethesda, MD (USA). International Cancer Research Data Bank). 1983. 12 issuesp. Paper copy available on subscription, North American Continent price $30.00/year; all others write for quote. Also available in single copies.

No abstract available.

21917 **(PB—83-939000) Clinical treatment of cancer: radiation therapy. Cancergram ct15.** (National Cancer Inst., Bethesda, MD (USA). International Cancer Research Data Bank). 1983. 12 issuesp. Paper copy available on subscription, North American Continent price $30.00/year; all others write for quote. Also available in single copies.

This Cancergram covers all forms of radiotherapy being used in the treatment of cancer, including standard x-ray, cobalt 60 and radium irradiation as well as high linear energy transfer (LET), megavoltage, electron beam treartment, and radioactive interstitial implants. Coverage of this topic includes adverse effects of radiotherapy, radiocurability, radiodosimetry, radiosensitization, and study with specialized instrumentation such as the betatron and linear accelerator. Radiobiology, animal experiments, tissue culture experiments, carcinogenesis, and other preclinical studies will not be included except for those considered to have direct clinical relevance.

21918 **(PB—83-939100) Cancer detection annd management: diagnostic radiology. Cancergram ct14.** (National Cancer Inst., Bethesda, MD (USA). International Cancer Research Data Bank). 1983. 12 issuesp. Paper copy available on subscription, North American Continent price $30.00/year; all others write for quote. Also available in single copies.

The Cancergram covers the field of diagnostic radiology from amniography to xerography in all of its clinical applications. It also includes such closely related techniques as fluoroscopy, ultrasonography, and thermography. Areas of interest are the clinical applications of these techniques, instrumentation, comparative studies, and any preclinical studies that have direct clinical relevance. Radiation therapy, or the use of radioactive isotopes and other nuclear medicine techniques, are not in scope, as they are covered by Cancergrams CT15 and CT02, respectively.

21919 (STI/PUB—625) **Radioimmunoassay and related procedures in medicine 1982.** (International Atomic Energy Agency, Vienna (Austria)). 1982. 810p. (CONF-8206161—). UNIPUB, P.O. Box 433, Murray Hill Station, New York, NY 10016.

From IAEA symposium on radioimmunoassay and related procedures in medicine; Vienna, Austria (21 Jun 1982).

Although it is now almost a quarter of a century since radioimmunoassay and related techniques were introduced into clinical medicine and research, the fields in which they are applicable continue to expand and new methods continue to appear. Already widely used in the assay of hormones, vitamins, drugs and various other substances, these techniques now offer considerable promise for application to parasitic and infectious diseases, which are of special importance in developing countries. The advent of monoclonal antibody methodologies gives hope for improved specificity, sensitivity and convenience, as do other technical developments such as procedures for labelling tracer substances and separating bound from unbound tracer. Labels of various kinds other than radionuclides are being intensively tested and can be expected to be of growing importance. The progress towards new areas of application, new techniques, and wider utilization throughout the world justifies a continuing emphasis on quality assurance. The expanding realization of the importance of this discipline and the increasingly wide availability of good data-processing programs for inexpensive computers suggest that this subject will receive growing attention. This symposium included 76 presentations, of which 9 were review papers and 23 were posters. These contributions, together with edited summaries of the discussions, constitute the contents.

21920 **Temperature rise during photoradiation therapy of malignant tumors.** Svaasand, L.O.; Doiron, D.R.; Dougherty, T.J. (Division of Physical Electronics, University of Trondheim, N-7034 Trondheim NTH, Norway). *Medical Physics;* **10**: No. 1, 10-17(Jan 1983).

This report discusses the optical and thermal distribution during photoradiation therapy of malignant tumors. Emphasis is put on the therapeutic procedure with the light dose delivered through an inserted optical fiber. Theoretical predictions and experimental results indicate that the temperature rise during the procedure may give rise to hyperthermal cell kill. The report discusses the extent of the regions with hyperthermal bioeffects in terms of tissue parameters as optical absorption and scattering, thermal conductivity, specific heat, blood flow, and optical dose parameters as optical power and exposure time. Key words: photoradiation therapy, hematoporphyrin derivative, hyperthermia

21921 **Density and composition imaging by photon energy spectrum sensing.** Jacobs, A.M.; Anghaie, S.; Kondic, N.N. (U.S. Nuclear Regulatory Commission, Washington, DC 20555). *Transactions of the American Nuclear Society;* **41**: 485-486(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

21922 **Application of radioactive aerosols in diagnostic techniques of bronchial obstructions in the clinical practice.** Koehler, D.; Daikeler, G.; Schuemichen, C.; Siebold, A.; Matthys, H. pp vp of Aerosols in science medicine and technology. Stoeber, W.; Hochrainer, D. (eds.). Bad Soden, Germany; Gesellschaft fuer Aerosolforschung e.V. (1981). (In German)

From Conference on aerosols in science and technology - aerosols in and from in and from industrial processes; Duisburg, F.R. Germany (23 Sep 1981).

Description of a technique for early diagnosis of chronical bronchitis, that is based on analyzing of deposition patterns obtained by inhalation of radioactive aerosoles. To this effect a new atomizer has been developed that permits to draw quantitative indications from inhalation scintiscanning.

21923 (CAPE—2761) **CAT Scanner Electron Gun (Engineering Materials).** (Stanford Linear Accelerator Center, CA (USA)). [nd]. Contract AC03-76SF00515. TIC. Order Number DE83005765.

The assembly drawing SA 701-171-01-RO CAT SCANNER ELECTRON GUN and drawings and parts listed thereon provide the data for constructing an electron gun for supplying a source of electrons for creating a suitable x-ray beam needed in some CAT scanning devices. This particular assembly is for use with a CAT scanner developed at the University of California Hospital at San Francisco, California.

5507 Microbiology

REFER ALSO TO CITATION(S) 19782, 19921, 19923, 19925, 19926, 19937, 19939, 19986, 20023, 20255

21924 (SERI/CP—230-1797, pp 1-39) **Study of methanogens by genetic techniques.** Bertani, G.; Baresi, L. (California Inst. of Tech., Pasadena). Dec 1982. NTIS, PC A07/MF A01.

From SERI biomass program principal investigators review meeting; Washington, DC, USA (23 Jun 1982).

Very little information exists on the genetics of methanogenic bacteria, but significant progress in the exploitation of methanogenesis for technological purposes cannot be made without a fairly detailed knowledge of the genes involved, their products, and their regulation. This paper describes the work during the first year of a program to define the genetic systems of methanogenic bacteria. Four species of methanogens were screened for suitable growth characteristics. Methanococcus voltae and Methanobacterium thermoautotrophicum were selected for extensive work. The culture and nutritional requirements of both are given. Using ultraviolet light as a mutagenic agent, two mutants of M. voltae have been isolated and are being studied; another large sample of isolates is under investigation. A stable mutant has been isolated which will grow in higher concentrations of bromo-ethane-sulfonate (the brominated analog of Coenzyme M involved in the terminal step of methanogenesis). Also described is the sensitivity of these bacteria to antibiotics. Once the preliminary work is complete and a set of satisfactory mutants is obtained, they will be tested in at least two types of genetic recombination experiments: conjugation and DNA transformation. A search for phages will also be initiated. (CKK)

21925 (SERI/CP—230-1797, pp 41-52) **Nutritional stimulation of methane fermentation.** Speece, R.E.; Parkin, G.F.; Gallagher, D. (Drexel Univ., Philadelphia, PA). Dec 1982. NTIS, PC A07/MF A01.

From SERI biomass program principal investigators review meeting; Washington, DC, USA (23 Jun 1982).

A study was undertaken to assay the maximum acetate-utilization rates which could be produced by inorganic and organic components which had previously proven to be stimulatory to acetate-utilizing methanogenic bacteria in batch culture. Nickel, yeast extract, iron, and cobalt in various combinations were studied as the key stimulants. The pH Stat technique was used to obtain a continuous culture. Exceptionally high acetate-utilization rates were observed which were 15 times greater than what is conventionally considered to be high rate digestion, i.e. 3.3 g/l-day. It appears that nickel, iron, and/or cobalt must be supplemented to achieve high volative suspended solids (VSS) concentrations. With yeast extract only as the supplement, the highest VSS observed was 1800 mg/l; with nickel, iron, and cobalt, VSS was 3000 mg/l; and with nickel and yeast extract, VSS was 7000 mg/l. The capability of achieving such high acetate-utilization rates (51 g/l-day, 20 volumes CH_4/volume of culture/day) appears to indicate that the methanogens are indeed a unique biological group. (CKK)

21926 Bioaccumulation of technetium by marine phytoplankton. Fisher, N.S. (International Lab. of Marine Radioactivity, Monaco). *Environmental Science and Technology;* **16**: No. 9, 579-581(Sep 1982). Contract AM06-76RL02227.

/sup 95m/Tc, in the IV and VII oxidation states, was added in picomolar quantities to monocultures of seven species of marine phytoplankton, including a green algae (Dunaliella tertiolecta), a diatom (Thalassiosira pseudonana), a blue-green alga (Oscillatoria woronichinii), a prasinophyte (Testraselmis chuii), two haptophytes (Emiliania huxleyi and Cricosphaera carterae), and a dinoflagellate (Heterocapsa pygmaea). Cultures were incubated for 4 days, and uptake of Tc was periodically determined by γ spectroscopy of filtered and unfiltered samples. All the Tc remained in the water column in all flasks, but none of the species appreciably concentrated the element in either oxidation state. Mean uptake (measured as the fraction retained on filters) for all species was 0.029% for Tc(IV) and 0.023% for Tc(VII), neither of which was significantly different from the uninoculated control cultures. Wet weight concentration factors never exceeded 20 for any species, 3 orders of magnitude lower than previously reported for phytoplankton and Tc. The results indicate that phytoplankton are likely to have negligible influence on the cycling of Tc in marine systems.

21927 DNA packaging in vitro by an isolated bacteriophage T7 procapsid. Masker, W.E. (Oak Ridge National Lab., TN); Serwer, P. *Journal of Virology;* **43**: No. 3, 1138-1142(Sep 1982). Contract W-7405-ENG-26.

The results of previous in vivo studies indicate that a DNA-free procapsid (capsid I) packages bacteriophage T7 DNA during infection of Escherichia coli. It was shown here that capsid I, isolated by electrophoresis in metrizamide density gradients, packaged DNA and formed infectious phage particles when incubated in vitro with extracts deficient in capsid proteins.

5509 Pathology

REFER ALSO TO CITATION(S) 21915, 21916, 21975

5510 Physiological Systems

REFER ALSO TO CITATION(S) 22568

21928 Orientations of terminal cladodes of Platyopuntias. Nobel, P.S. (Univ. of California, Los Angeles). *Bilten Dokumentacije;* **143**: No. 2, 219-224(1982). Contract AC03-76SF00012.

The orientations of terminal unshaded cladodes of 23 species of platyopuntias were observed in North America, South America, Australia, and Israel. When the seasonality of rainfall favored cladode development in the winter and the site was located above 27°N, the cladodes tended to face north-south (five cases, $P < .001$ for each). In all other cases without topographical blockage of incoming radiation, the tendency was to face east-west. For example, terminal cladodes of Opuntia phaeacantha var. discata and O. stricta tended to face north-south in Israel but east-west in the United States ($P > .001$). Such dissimilar orientation patterns also occurred for cladodes of 0. chlorotica at two sites in the Sonoran Desert and for O. basilaris var. basilaris developing at different seasons at a single site. Contrary to previously published observations, cladodes of O. ficus-indica and O. compressa had a significant tendency to orient ($P > .001$). When topographical features affected the direction of prevailing photosynthetically active radiation (PAR), the preferred orientation of terminal cladodes was changed accordingly. The preferred direction always maximized the interception of PAR, which is often a limiting factor in the productivity of cacti, even in a putatively high radiation environment.

21929 Effects of age on lung function and structure of adult animals. Mauderly, J.L.; Hahn, F.F. (Lovelace Biomedical and Environmental Research Inst., Albuquerque, NM). *Advances in Veterinary Science and Comparative Medicine;* **26**: 35-77(1982). Contract AC04-76EV01013.

The approach taken in this article is largely a review and summary of previously published data, although some original data are included. The review concentrates on the effects of aging in adults rather than during development of the immature lung. In that context, aging and age-related changes will be considered to include phenomena which occur only after young adulthood. Reports containing data from animals at different ages are included, regardless of whether aging per se was an object of study. Reports containing data from animals at a single age or within a very narrow age range are not included. Thus, age-related differences measured by different investigators using a variety of techniques are compared, but no attempt is made to compare data obtained from animals at single ages by different investigators using different techniques. The article is organized by first presenting a summary (Section II) of the information available on the effects of aging on the lungs of each species. Section III consists of a detailed review of the information available for each species. The species are presented in order of decreasing amount of data available: dog, rat, Syrian hamster, rabbit, mouse, and horse. Abbreviated terms used throughout the remainder of the article are listed in Section III (footnote). Similarities and differences among species and comparisons with man are discussed in Section IV.

5520 Public Health

REFER ALSO TO CITATION(S) 21914

5530 Agriculture And Food Technology

REFER ALSO TO CITATION(S) 21825, 21898, 21910, 21992, 22003

21930 (DOE/SR/10702—3) Effect of seeding and site-preparation practices on the establishment of sericea (Lespedeza cuneata). Annual report, September 1, 1981-December 31, 1982. Jorgensen, J.R. (Forest Service, Asheville, NC (USA). Southeastern Forest Experiment Station). 1982. Contract AI09-80SR10702. 15p. NTIS, PC A02/MF A01. Order Number DE83007906.

Sericea lespediza stands for forestry purposes were established by several methods. Stand development was followed over two growing seasons. On soils that ranged from excessively to moderately well drained, buring was nearly as effective for stand establishment as was intensive disking. Planting 11.2 kg of seed/ha produced adequate first-year stands. During the second growing season, stands - especially those with few plants, became more dense. Seeding in late winter was more successful than in late spring. Coated seed improved initial stand establishment and second-year development on severe and moderate sites sown in the winter but had little influence on stands seeded in late spring. Phosphorus fertilization had no influence on first-year establishment or development, but height of plants grown on moderate sites was improved by fertilization in the second year.

21931 (NP—3900158) Population dynamics and ecology of Tilapia rendalli in Lago Sauce (Peru). Wosnitza-Mendo, C. (Kiel Univ. (Germany, F.R.). Inst. fuer Meereskunde). 1980. 141p. (In German). NTIS (US Sales Only), PC A07/MF A01. Order Number DE83900158.

This is a practical contribution to development aid in Peru. It was to provide a basis for farming of Lago Sauce and similar lakes and introduce young Peruvian fishery biologists to practical and theoretical work with populations of freshwater fish. Various methods of biomass determination have been compared in order to find out why only small specimens of Tilapia rendalli have been caught and what ichthyobiomass was in the lake.

21932 (TVA—3901680) Users manual for YIELD: timber-yield forecasting and planning tool, Version 1.2. Hepp, T.E. (Tennessee Valley Authority, Norris (USA). Div. of Land and Forest Resources). Feb 1983. 48p. NTIS, PC A03/MF A01. Order Number DE83901680.

YIELD is an interactive FORTRAN program designed to aid foresters in determining timber management recommendations. YIELD allows the forester to input information, provide direction, and receive answers to specific questions at the computer terminal. The user can preview the simulated effect that various management strategies have on forest growth, yield and financial profitability. Information communicated from the program is useful for evaluating and scheduling timber management activities. YIELD addresses the forest stand (existing or future) as the unit of analysis. Input includes current stand conditions, a harvest schedule and simple financial data. Output consists of concise reports that summarize forecasted volume yield, cash flows, and measures of profitability (i.e., internal rate of return and present net worth). The interactive design enables the forester to see how profitability measures change in response to a changing harvesing schedule or planting density, or with the manipulation of a number of variables. An option is available to perform financial calculations on either a before or after taxation basis. YIELD provides stand level growth, yield, and financial analysis information.

21933 (TVA/ONR/LFR—83/4) **Comparable Sale Data Base users manual. Version 1.1.** Purcell, J.E. (Tennessee Valley Authority, Norris (USA). Office of Natural Resources). Nov 1982. 31p. NTIS, PC A03/MF A01. Order Number DE83901676.

The Comparable Sale Data Base (COMPSALE) is a computer-based information system for consulting foresters and others involved in buying and selling property, timber, agricultural products, or other marketable commodities. COMPSALE allows the forester or resource manager to store sale data in the computer and access the data later in summary form. It puts comparable sale information at the forester's fingertips through easy-to-use procedures. The computer asks the necessary questions to guide the user through each procedure. Step-by-step instructions are given for inputting data in the program. COMPSALE is designed to work on microcomputers with a CRT screen, a floppy disk data storage, an 80-column printer, and the ability to run the COBOL program.

21934 (TVA/ONR/LFR—83/6) **User's manual for the TVA lumber yield and value program (LYVP). Version 1.0.** Harrison, T.P. (Tennessee Valley Authority, Norris (USA). Office of Natural Resources). Nov 1982. 49p. NTIS, PC A03/MF A01. Order Number DE83901675.

The Lumber Yield and Value Program (LYVP) is complementary to the Inventory Processor. (See: A User's Manual for the TVA Forest Inventory Program, July 1979, Station Bulletin No. 230). Many of the inputs needed for the Inventory Processor are also used by LYVP. Tree grade must be supplied for LYVP, but is optional for the Inventory Processor. Data on pulpwood observations, pine sawtimber, cull trees, and growth projections are ignored by LYVP, but may be necessary for compatibility with the Inventory Processor. Output tables predict board foot volume and dollar value by species and lumber grade. Summary data are presented on both tract and per-acre basis as well as for the entire sampling unit. The lumber yields expressed in LYVP are functions of species, d.b.h. merchantable height, and tree grade; therefore, some of the inputs used for the Inventory Processor such as log rule and form class are not needed when LYVP is used independently. Lumber prices used in LYVP calculations to predict lumber values may be obtained from any reliable source. Prices used by TVA are from the Hardwood Market Report and reflect lumber values for air dried, carload lots. Stumpage prices should not be used in any LYVP calculations.

56 BIOMEDICAL SCIENCES, APPLIED STUDIES

21935 (UCID—19676) **Calculation and interpretation of In-Situ measurements of initial radiations at Hiroshima and Nagasaki.** Loewe, W.E. (Lawrence Livermore National Lab., CA (USA)). 16 Feb 1983. Contract W-7405-ENG-48. 39p. (CONF-830209—1). NTIS, PC A03/MF A01. Order Number DE83006396.

From US/Japan joint workshop on the reassessment of A-bomb radiation dosimetry in Hiroshima and Nagasaki; Nagasaki, Japan (16 Feb 1983).

Cobalt activation calculations will be reviewed, and similar comparisons of sulfur activation interior to electrical insulators on power transmission lines will be discussed. The relationship between neutron tissue kermas one to two kilometers from hypocenter and the particular activations of cobalt and sulfur are reviewed. At present, measured and calculated quantities agree within associated uncertainties, which are substantial. Additional work to shrink these uncertainties will be discussed. Particular cobalt activation topics will include: the sensitivity to thermal neutrons outside the pillar; calculated values using actual Nagasaki concrete composition; and calculational advances to improve modelling of the actual configuration. Particular sulfur activation topics will include: absolute comparisons of measured and calculated ratios of dpm/gm of ^{32}P at all measured ranges, based on approximate experimental values for insulator attentuation and source radiations; the relationship between sulfur activation within a kilometer of hypocenter and kermas at two kilometers; and calculational advances to improve modelling of the actual configuration.

5601 Radiation Effects

REFER ALSO TO CITATION(S) 19883, 19883, 19884, 20709, 20711, 20711, 21666, 21667, 21671, 21805, 21831, 21832, 21833, 21834, 21836, 21837, 21840, 21872, 21875, 21926, 21990, 22543

21936 (AD-A—115541/5) **Aircrew ionizing doses from radioactive dust cloud generated by nuclear burst. Master's thesis.** Hickman, B.E. (Air Force Inst. of Tech., Wright-Patterson AFB, OH (USA). School of Engineering). Mar 1982. 77p. (AFIT/GNE/PH—82M-9). NTIS, PC A05/MF A01.

This report will evaluate the threat of radioactive fallout to which aircrew members will be exposed when flying through a descending fallout cloud. A computer program is developed for calculating the ionizing dose rate of a radioactive dust cloud as a function of time, and also the dose that an aircrew receives when flying through the respective cloud. A cloud model that is patterned after the AFIT fallout smearing code was developed. A comparison is made between the activities at various altitudes from 305 meters to 9150 meters to provide information for possible re-direction of flight. The external ionizing dose to the aircrew is computed by the new code considering the cloud size, the aircraft's transit time through the cloud, and the ingestion rate of radioactive particles into the aircraft's cabin. Information is also provided to indicate the method by which doses can be computed from a cloud of multiple bursts. The results demonstrate that total dose to each aircrew member is approximately 8 rems after flying through a fallout cloud one hour after cloud stabilization of a 1 Mt burst, with the mission continuing for eight hours subsequent to the cloud transit.

21937 (AD-A—115825/2) **Behavioral studies following ionizing radiation exposures: a data base. Technical report.** Franz, C.G.; Young, R.W.; Mitchell, W.E. (Armed Forces Radiobiology Research Inst., Bethesda, MD (USA)). Aug 1981. 94p. NTIS, PC A05/MF A01.

For over a decade, the Behavioral Sciences Department (BHS) of the Armed Forces Radiobiology Research Institute (AFRRI) has collected data concerning the effects of ionizing radiation on primate performance. These data are the basis for the current radiation combat casualty criteria used by the armed forces of this country and NATO. In order to ensure the continued accessibility of these data and to increase their usefulness in retrospective studies, the data have been consolidated into a computerized data base. This report provides potential users with the background and details necessary to access the data base and to retrieve information from it. The report defines the search parameters for the data base, and discusses the sources, extent, and reliability of data contained in the data set.

21938 (AD-A—121713/2) **Theory, electro-optical design, testing, and calibration of a prototype atmospheric supersaturation, humidity, and temperature sensor. Final report Mar 81-Jul 82.** Nelson, L.D. (Newmark, Hansen and Associates, Urbana, IL (USA)). 15 Jul 1982. 117p. NTIS, PC A06/MF A01.

A new infrared differential absorption - passive thermal emission based instrument designed to make accurate in-cloud measurements of absolute humidity, air temperature, relative humidity, and ice and water supersaturations has been developed. Absolute humidity is measured by the differential infrared absorption of a broad-band light beam between 2.45 microns wavelength and the strongly absorbing water vapor band at 2.67 microns. Air temperature is sensed by a passive radiometric measurement of the Planck's law radiance emitted by carbon dioxide molecules in their very intense emission band at 4.25 microns. Significant operational advantages over previous 14-16 micron band radiometers are achieved. These non-contact optical measurements of absolute humidity and true air temperature can then be combined to yield relative humidity values with respect to both water and ice which remain valid in condensing supersaturated conditions and in spite of hydrometeors in the sample volume.

21939 (AD-A—121815/5) Biochemical changes in blood components after lethal doses of radiation. Final report Oct 80-Sep 81. Magro, A.M. (Newmark, Hansen and Associates, Urbana, IL (USA)). Oct 1982. 28p. NTIS, PC A03/MF A01.

Nonpeptide, peptide, and protein blood components were measured postirradiation in Wistar rats to investigate biochemical changes that might be related to or form the basis of radiation-induced emesis. The rats were irradiated with lethal doses of radiation, and blood components were analyzed at various times postirradiation. The blood-component levels were compared to those of nonirradiated controls to determine if any significant changes occurred due to the radiation.

21940 (ANL/NESC—908) AERIN; radioactive aerosol dose calculations. Voilleque, P.G. (USDOE Idaho Operations Office, Idaho Falls). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048908.

Maxima of - 9 organs 299 calculations per organ It is assumed that the blood acts only as a mechanism for the transport of material to the various body organs and tissues and need not be considered a separate compartment.

AERIN calculates organ and tissue burdens and doses resulting from acute exposure to a radioactive aerosol as a function of time after exposure. The International Commission on Radiological Protection (ICRP) model proposed by the Task Group on Lung Dynamics is used to predict deposition and retention of the aerosol in the lungs.IBM360,303x; FORTRAN IV; OS/360; 105K bytes of memory are required for execution.

21941 (ANL/NESC—923) DACRIN; radiation organ dose from inhalation. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Watson, E.C. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048923.

Maxima of - 10 downwind distances at which dose is calculated 10 organs 10 time intervals measured from the most recent intake 5 multiple intake intervals.

DACRIN is designed to provide rapid and consistent estimates of the effective radiation dose to the human respiratory tract and other organs resulting from the inhalation of radioactive aerosols. The program will calculate the effective radiation dose to any of 18 organs and tissues from inhalation of any one or a combination of radionuclides considered by the International Commission on Radiological Protection (ICRP). Input to the program consists of a few program control variables, the duration of inhalation exposure, ventilation rate, the time interval within which the dose is delivered, the organs of interest, the quantity of the radionuclide inhaled, its solubility class and particle size, and, when an atmospheric dispersion model is invoked, the additional parameters required for the model selected. Output provided by DACRIN consists of the effective radiation dose to the specified organs at selected time intervals for each radionuclide inhaled as indicated by the input data.UNIVAC1100; FORTRAN; EXEC8; 56,000 words of memory are needed to execute the program.

21942 (ANL/NESC—924) SUBDOSA; external dose airborne radionuclides. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Houston, J.R. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048924.

Maxima of - 500 nuclides 10 downwind distances 6 release time intervals 4 tissue depths SUBDOSA does not consider the dose resulting from radionuclides deposited in the body and its organs via inhalation.

SUBDOSA calculates external gamma and beta doses to individuals from the accidental release of radionuclides to the atmosphere. Doses are calculated as a function of: quantity released, duration of release, atmospheric conditions during the release, and horizontal distance from the release point. Doses from both gamma and beta radiation are calculated as a function of depth in tissue, summed and reported as skin, eye, gonadal, and total body dose. Doses are calculated within each of several release time intervals with separate nuclide inventories and atmospheric dispersion conditions used for each interval. Radioactive decay using a chain decay scheme with branching to account for transitions to and from isomeric states is considered during the release. The program computes normalized air concentrations at ground level as a function of distance from the point of release.UNIVAC1100; FORTRAN; EXEC8; 43,000 words of memory are needed for execution of SUBDOSA. BIVAR, an auxiliary program which calculates dose rate factors as a function of energy, requires 13,000 words of memory.

21943 (ANL/NESC—925) ARRRG;FOOD; aquatic & terrestrial radiation. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Strenge, D.L. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048925.

Maxima of - 23 possible body organs or tissues (ARRRG and FOOD) 5 organs and 100 radionuclides in a mixture (ARRRG and FOOD) 5 ingestion pathways (ARRRG) 3 external pathways (ARRRG) 14 food type pathways (FOOD) 1 external pathway (FOOD);.

ARRRG calculates radiation doses to humans for radionuclides released to bodies of water from which people might obtain fish, other aquatic foods, or drinking water, and in which they might fish, swim, or boat. FOOD calculates radiation doses to humans from deposition on farm or garden soil and crops during either an atmospheric or water release of radionuclides. Deposition may be either directly from the air or from irrigation water. With both programs, doses may be calculated for either a maximum-exposed individual or for a population group. Doses calculated are a one-year dose and a committed dose from one year of exposure. The exposure is usually considered as chronic; however, equations are included to calculate dose and dose commitment from acute, one-time, exposure.UNIVAC1100; FORTRAN; EXEC8; 51,000 words of memory are required to execute ARRRG; 61,000 words are required by FOOD.

21944 (ANL/NESC—926) PABLM; accumulated environment radiation dose. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Soldat, J.K. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048926.

Maxima of - 23 possible body organs or tissues 19 ingestion pathways 5 organs and 100 radionuclides in a mixture 4 external exposure pathways.

PABLM calculates internal radiation doses to man from radionuclides in food products and external radiation doses from radionuclides in the environment. Radiation doses from radionuclides in the environment may be calculated from deposition on the soil or plants during an atmospheric or liquid release, or from exposure to residual radionuclides after the releases have ended. Radioactive decay is considered during the release, after deposition, and during holdup of food after harvest. The radiation dose models consider exposure to radionuclides deposited on the ground or crops from contaminated air or irrigation water, radionuclides in contaminated drinking water, aquatic foods raised in contaminated water, and radionuclides in bodies of water and sediments where people might fish, boat, or swim. For vegetation, the radiation dose model considers both direct deposition and uptake through roots. Doses may be calculated for either a maximum-exposed individual or for a population group. The program is designed to calculate accumulated radiation doses from the chronic ingestion of food products that contain radionuclides and doses from the external exposure to radionuclides in the environment. A first-year committed dose is calculated as well as an integrated dose for a selected number of years.UNIVAC1100; FORTRAN; EXEC8; 80,000 words of memory are required to execute the PABLM program.

21945 (CONF-820451—2) **Human-health effects of radium: an epidemiolgic perspective of research at Argonne National Laboratory.** Stebbings, J.H. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 39p. NTIS, PC A03/MF A01. Order Number DE83007799.

From DOE radiation epidemiology contractors workshop; Rockville, MD, USA (13 Apr 1982).

The topic of health effects of radium has recently been considerably broadened by the identification of multiple myeloma as a specific outcome of bone-seeking radionuclides, and by evidence that the incidence of breast cancer may be significantly increased by radium exposure. All soft-tissue tumors are now suspect, especially leukemias. Concepts of dose-response need to be broadened to include the concept of risk factors, or, if one prefers, of susceptible subgroups. Biological factors relating to radium uptake and retention require study, as do risk factors modifying risk of both the clasical tumors, osteosarcoma and nasal sinus/mastoid, and the more recently suspect soft-tissue tumors. The history, organization, and current research activities in epidemiology at Argonne National Laboratory are described, and findings of the last decade and a half reviewed. Plans for future research are briefly discussed.

21946 (DOE/EV/04992—T1) **Study of feasibility of detecting effects of low-dose radiation in shipyard workers. Final report, May 15-August 15, 1978.** Matanoski, G.M. (Johns Hopkins Univ., Baltimore, MD (USA)). Dec 1982. Contract AC02-78EV04992. 10p. NTIS, PC A02/MF A01. Order Number DE83007973.

There is very little information available on the chronic health effects from repeated low-level doses of radiation. This study examines the adequacy of determining radiation exposure doses in shipyard workers, the procedures used in the radiation control programs, and the feasibility of establishing an appropriate population of nuclear and non-nuclear shipyard workers for long-term studies of low-level radiation. The availability of records and the methods of population identification and of measurement of radiation dose were determined during initial visits to the yards. Personnel, industrial hygiene, radiation and medical records were examined for suitability, completeness and accuracy. It was necessary to assure that no possible errors or omissions in personnel and radiation records existed in order that the final data will have validity. Preliminary investigations on the methods of follow-up in the Portsmouth population and the time required for each procedure were also undertaken in order to have a better estimate of the total cost for a long term study.

21947 (GSF-BPT—2/81, pp 190-194) **Investigations on the influence of increased UV-B-radiation on the development, composition, structure and function of plants.** Tevini, M.; Iwanzik, W. May 1981. (In German). NTIS (US Sales Only), PC A10/MF A01.

From 2. seminar of the Gesellschaft fuer Strahlen- und Umweltforschung; Neuherberg, F.R. Germany (27 Oct 1980).

The influences of increased UV-B-radiation with various intensities, such as would be expected after a reduction of the ozone layer, were examined on barley, corn, beans and red radish. The biological efficacy of the UV-B-radiation can be assessed with the aid of weighting functions for DNA. Examination of the structure of the leaf surfaces by stereo-scan-microscopy showed a far-reaching collapse of the epidermis and stomata following the UV-B-radiation.

21948 (GSF-BPT—2/81, pp 195-199) **Influence of increased UV-B-radiation on cultivated plants following pollutant immission.** Esser, G. May 1981. (In German). NTIS (US Sales Only), PC A10/MF A01.

From 2. seminar of the Gesellschaft fuer Strahlen- und Umweltforschung; Neuherberg, F.R. Germany (27 Oct 1980).

The investigations were carried out in the open air on potatoes, spring-barley, spinach, savoy, beans and large radish. Parameters for the UV-B-action were the yield, production (photosynthesis, photorespiration and darkness respiration rates), as well as the content of plant constituents such as protein, starch, sugar, total lipids, chlorophyll and vitamin C. A remarkably strong reaction of the test plants to very slight UV-B-intensities was seen.

21949 (GSF-BPT—2/81, pp 200-203) **Quantitative UV action.** Zoelzer, F.; Kiefer, J. May 1981. (In German). NTIS (US Sales Only), PC A10/MF A01.

From 2. seminar of the Gesellschaft fuer Strahlen- und Umweltforschung; Neuherberg, F.R. Germany (27 Oct 1980).

In a wild-type strain and an excision-deficient strain the survival and resistance to mutation against canavanin upon radiation with increasing wavelength were studied. As compared to the latter, the wild type is less sensitive by about two orders of magnitude. With increasing wavelength, a lessening of the mutagenic action as compared to the lethal one is observed. Moreover the importance of photo-reactivatable damage decreases. An unchanged importance in the excision-deficient form is noted.

21950 (INIS-mf—7498, pp v) **Investigation levels in urine of long-lived uranium isotopes.** Schlesinger, T.; Shamai, Y. (Israel Atomic Energy Commission, Yavne. Soreq Nuclear Research Center). 1982. .

From Nuclear societies of Israel joint annual meeting; Haifa, Israel (16 Feb 1982).

Published in summary form only.

21951 (INIS-mf—7499, pp v) **Radiation burden of fetuses from radioisotope and X-ray examinations of pregnant women.** Susila, M. (Nemocnice s Poliklinikou, Prerov (Czechoslovakia)); Husak, V.; Wiedermann, M.; Ryznar, V. (Fakultni Nemocnice, Olomouc (Czechoslovakia). Oddeleni Nuklearni Mediciny). 1980. (In Czech). .

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

Published in summary form only.

21952 (INIS-mf—7499, pp v) **Some methodological aspects of epidemiological study into delayed radiation effects.** Sevc, J.; Kunc, E.; Tomasek, L. (Institut Hygieny a Epidemiologie, Prague (Czechoslovakia)). 1980. (In Czech). .

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

Published in summary form only.

21953 (INIS-mf—7499, pp v) **Selection of statistical tests in epidemiological study of delayed radiation effects.** Tomasek, L.; Sevc, J. (Institut Hygieny a Epidemiologie, Prague (Czechoslovakia)). 1980. (In Czech). .

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

Published in summary form only.

21954 (INIS-mf—7499, pp v) **Characteristics of long-persistence changes in chromosomal picture of man after overexposure to radiocobalt.** Tuscany, R.; Kliment, V. (Institut Hygieny a Epidemiologie, Prague (Czechoslovakia)). 1980. (In Czech). .

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

Published in summary form only.

21955 (INIS-mf—7499, pp v) **Morbidity and mortality in group of chronically exposed uranium mine personnel.** Vich, Z.; Kubat, M. (Zavodni Ustav Narodniho Zdravi Uranoveho Prumyslu, Pribram (Czechoslovakia)). 1980. (In Czech). .

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

Published in summary form only. .

21956 (INIS-mf—7499, pp vp) **Long-term internal contamination with radiocerium: incorporation of ^{3}H-thymidine in circulating lymphocytes in rats.** Beno, M.; Cierna, V.; Hrabovcova, A. (Vyskumny Ustav Preventivneho Lekarstva, Bratislava (Czechoslovakia)). 1980. (In Slovak). .

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

Published in summary form only.

21957 (INIS-mf—7499, pp v) **History of population exposure due to radioactive fallout. I. History of ^{90}Sr content in bones of population of the CSR.** Brezik, Z.; Brezikova, D.; Kunz, E. (Institut Hygieny a Epidemiologie, Prague (Czechoslovakia). Ustav Hygieny Zareni). 1980. (In Czech). .

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

Published in summary form only.

21958 (INIS-mf—7499, pp v) **History of population exposure due to radioactive fallout. II. History of daily dietary ^{90}Sr intake of population.** Brezikova, D.; Kunz, E.; Brezik, Z. (Institut Hygieny a Epidemiologie, Prague (Czechoslovakia). Ustav Hygieny Zareni). 1980. (In Czech). .

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

Published in summary form only.

21959 (INIS-mf—7499, pp v) **Interpretation of results in personnel monitoring.** Bucina, I.; Thomas, J.; Nedved, M. (Institut Hygieny a Epidemiologie, Prague (Czechoslovakia)). 1980. (In Czech). .

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

Published in summary form only.

21960 (INIS-mf—7499, pp v) **Participation of gastrointestinal tract in ^{85}SrCl$_2$ contamination by inhalation.** Halik, J.; Lenger, V. (Institut Hygieny a Epidemiologie, Prague (Czechoslovakia). Ustav Hygieny Zareni). 1980. (In Czech). .

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

Published in summary form only.

21961 (INIS-mf—7499, pp v) **Development of various histological types of malignant lung tumour in relation to radiation exposure.** Horacek, J. (Okresni Ustav Narodniho Zdravi, Patologicko-Anatomicke Oddeleni, Karlovy Vary (Czechoslovakia)); Sevc, J. (Institut Hygieny a Epidemiologie, Prague (Czechoslovakia). Ustav Hygieny Zareni). 1980. (In Czech). .

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

Published in summary form only.

21962 (INIS-mf—7499, pp vp) **Radiocarbon monitoring in occupationally exposed personnel.** Houskova, M.; Thomas, J.; Cajkova, A. (Institut Hygieny a Epidemiologie, Prague (Czechoslovakia). Ustav Hygieny Zareni). 1980. (In Czech). .

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

Published in summary form only.

21963 (INIS-mf—7499, pp v) **Long-term follow-up of chromosomal aberrations in relation to radon daughters intake in non-uranium ore miners.** Pekarek, V.; Zudova, Z. (Krajska Hygienicka Stanice, Usti nad Labem (Czechoslovakia)). 1980. (In Czech). .

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

Published in summary form only.

21964 (INIS-mf—7499, pp v) **Adverse cardiovascular changes after application of radioprotective substances, and their influencing.** Petracek, J.; Kuna, P.; Fusek, J. (Vojensky Lekarsky Vyzkumny a Doskolovaci Ustav J.E. Purkyne, Hradec Kralove (Czechoslovakia)). 1980. (In Czech). .

From 10. radiation hygiene days conference; Vranov nad Dyji, Czechoslovakia (7 Oct 1980).

Published in summary form only.

21965 **(N—82-18269) Advanced biostack experiment.** Buecker, H. (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt e.V., Aachen (Germany, F.R.). Inst. fuer Theoretische Gasdynamik). Nov 1981. 3p. NTIS, PC A08/MF A01.

In NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions 3 p (SEE N82-18234 09-12).

The Advanced Biostack Experiment is described. The objectives are: (1) to confirm, complement, and enlarge the information obtained from the previous experiments by applying improved and advanced methods of localization and physical and biological evaluation, performing advanced experiments based on these data, and including additional biological specimens and additional radiation detectors (2) to determine the biological importance of nuclear disintegration stars (3) to determine the interference of HZE particle induced effects with those of other space flight factors (e.g., weightlessness) and (4) to determine the distribution of HZE particles and of disintegration stars at different locations inside the module and on the pallet.

21966 **(PB—82-211236) Dosimetry for industrial radiation processing. Final report.** McLaughlin, W.L.; Humphreys, J.C.; Miller, A. (National Bureau of Standards, Washington, DC (USA)). Feb 1982. 8p. Pub. in Proceedings of a Meeting on Traceability for Ionizing Radiation Measurements, Gaithersburg, Maryland, May 8-9, 1980, p171-178 Feb 82.

In the dosimetry related to sterilization of goods by ionizing photons and electrons, and in other industrial radiation applications, i.e., modification of plastic and other materials, food preservation, and treatment of waste products, it is important to have traceability to standard absorbed dose measurements. The preferred primary methods of dosimetry for large radiation doses ($>$10 Gy) are considered. Using these techniques as primary reference methods, it is possible to calibrate the response characteristics of routine dosimeters, such as plastics, dyed plastics, and solid-state sensors in terms of a reproducible signal versus known values of absorbed dose. Dose levels and dose gradients within a sizable irradiated volume, e.g., product packages, are determined within specified values of uncertainty, which may be set in terms of statistical error and precision in making practical interpretation of dose and dose limits.

21967 **(PB—83-135707) Radiation protection: progress report. 1981.** (Commission of the European Communities, Luxembourg). [nd]. 968p. NTIS PC E99/MF E99.

Progress achieved in more than 300 research projects carried out in the European Community in 1981 under the radiation protection program is reported. A comprehensive review of the status of the radiation protection studies in which the EC is participating is provided. Under the general heading of Research in Radiation Protection, details are given of work in radiation dosimetry and its interpretation, the behavior and control of radionuclides in the environment, short-term, late somatic, and genetic effects of ionizing radiation, and the evaluation of radiation risks. Coordination activities are reviewed. A selection of relevant publications issued on the initiative of the Commission is summarized, and attention is drawn to the 1981 edition of the Directive laying down the basic safety standards for the health and protection of the general public and workers against the dangers of ionizing radiation, adopted by the Council on July 15, 1980.

21968 **(PB—83-137372) Plutonium burdens in people living around the Rocky Flats plant. Final report 1976-79.** Cobb, J.C.; Eversole, B.C.; Archer, P.G.; Taggart, R.; Efurd, D.W. (Colorado Univ., Denver (USA). Health Sciences Center). Nov 1982. 256p. NTIS, PC A12/MF A01.

A study was conducted to determine whether the tissues of people who lived near to or downwind from the Rocky Flats nuclear weapons facility in Colorado contained more plutonium than the tissues from people who lived farther away. Information was collected on the age, sex, smoking history, residence history, presence of disease, and plutonium level in selected tissues from individuals autopsied in various Eastern Colorado hospitals. The 236, 238, 239 and 240 isotopes of plutonium were determined. Plutonium levels in lung and liver tissues were affected by age and smoking history more than by distance from the Rocky Flats Plant. Though the measured 240/239 isotope ratio indicated a small contribution from Rocky Flats, the total amount of plutonium in the samples was no different than in similar samples collected from other areas of the U.S.

21969 **(PB—83-935500) Radiation carcinogenesis. Cancergram ck06.** (National Cancer Inst., Bethesda, MD (USA). International Cancer Research Data Bank). 1983. 12 issuesp. Paper copy available on subscription, North American Continent price $30.00/year; all others write for quote. Also available in single copies.

The Cancergram deals with all aspects of radiation carcinogenesis. The term 'radiation' here includes U-V radiation and the entire electromagnetic spectrum, electron and other charged particle beams, neutrons, and alpha and beta radiation from radioactive substances. Abstracts included concern relationships between radiation and carcinogenesis in humans, experimental induction of tumors in animals by irradiation, studies on the mechanism of radiation carcinogenesis at the cellular level, studies of RBE, dose response or dose threshold in relation to radiation carcinogenesis, and methods and policies for control of radiation exposure in the general population. In general, this Cancergram excludes abstracts on radiotherapy, radiologic diagnosis, radiation pathology, and radiation biology, where these articles have no bearing on radiation carcinogenesis.

21970 (PNL-SA—10714, pp 68-73) **Reevaluation of the Hiroshima-Nagasaki radiation doses.** Roesch, W.C. (Pacific Northwest Lab., Richland, WA). Dec 1982. NTIS, PC A11/MF A01.

From 9. DOE workshop on personnel neutron dosimetry; Las Vegas, NV, USA (24 Jun 1982).

The dosimetry system currently used in analyzing the Hiroshima-Nagasaki data was developed by the Oak Ridge National Laboratory. Their T65 system was called into question following a new study of the incidence of leukemia in the two cities. H.H. Rossi and C.W. Mays concluded that a worker continually exposed to neutrons at the maximum permissible level recommended by the National Council on Radiation Protection (NCRP) stood a chance of developing leukemia that was several times higher than for the average unexposed person. Rossi and Mays recommended the NCRP reduce its permissible doses for neutrons by an order of magnitude. One of the reponses of the NCRP to this recommendation was to set up a Task Group on Atomic-Bomb Dosimetry, under the chairmanship of H.O. Wyckoff, to review the dosimetry for the data that had led to the Rossi-Mays conclusion. This paper reviews the work of this task group which has been divided into 5 areas: bomb spectra, fireball gamma rays, radiation transport, buildings, and depth dose.

21971 **(PNL-SA—11106) Field measurement and interpretation of beta doses and dose rates.** Selby, J.M.; Swinth, K.L.; Hooker, C.D.; Kenoyer, J.L. (Pacific Northwest Lab., Richland, WA (USA)). Jan 1983. Contract AC06-76RL01830. 15p. (CONF-830204—3). NTIS, PC A02/MF A01. Order Number DE83007077.

From International beta dosimetry symposium; Washington, DC, USA (15 Feb 1983).

A large number of portable survey instruments employing G.M., ionization chamber, and scintillation detectors used for gamma measurements are also used for monitoring in beta fields by using removable shields to separate the beta and gamma components of the radiation field. The difference does not correspond to an absorbed dose rate for the beta field due to a variety of factors. Among these factors are the dependence on beta energy, source-detector geometries, mixed fields and variable ambient conditions. Attempting to use such measurements directly can lead to errors as high as a factor of 100. Appropriate calibrations and correction factors can be used to reduce the errors in beta measurements to a tolerable level.

21972 **(UCID—19624) Reevaluation of an individual's radiation exposure at NTS in 1963-64.** Myers, D.S. (Lawrence Livermore National Lab., CA (USA)). 25 Feb 1983. Contract W-7405-ENG-48. 79p. NTIS, PC A05/MF A01. Order Number DE83008596.

The FRAN prompt burst reactor began operation at NTS on November 1, 1962 and continued in use until April 1965. From January 2, 1963 to August 12, 1964, an individual periodically performed maintenance and troubleshooting functions on various components of the FRAN reactor system. In June, 1980, the individual requested a review of the radiation dose that he received from his involvement with the FRAN reactor. An evaluation of the individual's radiation dose associated with the FRAN reactor operation was performed. This report details the reevaluation of the individual's estimated radiation dose from the FRAN reactor assembly, as derived from computer calculations, GODIVA-IV measurements, personnel dosimetry results, and a reconstruction of work scenarios.

21973 **(UCRL—88376) Tritium effects on germ cells and fertility.** Dobson, R.L.; Kwan, T.C.; Straume, T. (Lawrence Livermore National Lab., CA (USA)). 19 Nov 1982. Contract W-7405-ENG-48. 13p. (CONF-821167—1). NTIS, PC A02/MF A01. Order Number DE83007349.

From European seminar on the risks from tritium exposure; Mole, Belgium (22 Nov 1982).

Primordial oocytes in juvenile mice show acute gamma-ray LD_{50} as low as 6 rad. This provides opportunities for determining dose-response relations at low doses and chronic exposure in the intact animal - conditions of particular interest for hazard evaluation. Examined in this way, ^{3}HOH in body water is found to kill murine oocytes exponentially with dose, the LD_{50} level for chronic exposure being only 2μCi/ml (delivering 0.4 rad/day). At very low doses and dose rates, where comparisons between tritium and other radiations are of special significance for radiological protection, the RBE of tritium compared with ^{60}Co gamma radiation reaches approximately 3. Effects on murine fertility from tritium-induced oocyte loss have been quantified by reproductive capacity measurements. Chronic low-level exposure has been examined also in three primate species - squirrel, rhesus, and bonnet monkeys. In squirrel monkeys the ovarian germ-cell supply is 99% destroyed by the time of birth from prenatal exposure to body-water levels of ^{3}HOH (administered in maternal drinking water) of only 3 μCi/ml, the LD_{50} level being 0.5 μCi/ml (giving 0.1 rad/day), one fourth that in mice. Though not completely ruled out, similar high sensitivity of female germ cells has not been found in macaques; and it probably does not occur in man. The exquisite radiosensitivity of primordial oocytes in mice is apparently due to vulnerability of the plasma membrane (or something of similar geometry and location), not DNA. Evidence for this comes from tritium data as well as neutron studies. Tritium administered as ^{3}HOH, and therefore generally distributed, is much more effective in killing murine oocytes than is tritium administered as ^{3}H-TdR, localized in the nucleus. This situation in the mouse may have implications for estimating radiation genetic risk in the human female.

21974 **Radiation responses in air-, nitrous oxide-, and nitrogen-saturated mammalian cells.** Roots, R.; Chatterjee, A.; Blakely, E.; Chang, P.; Smith, K.; Tobias, C. (Lawrence Berkeley Laboratory, Berkeley, CA). *Radiation Research;* **92**: No. 2, 245-254(Nov 1982). Contract W-7405-ENG-48.

Characteristics of cellular radiation chemistry were studied for mammalian cells saturated with air, nitrous oxide, or nitrogen in the absence or presence of an OH-radical scavenger, for both low- and high-LET radiations. For clarity, the data for low-LET studies are presented separately in this paper, while the results for densely ionizing particle radiations will be discussed in a subsequent manuscript. Cell monolayers were grown in glass vessels and irradiated with 225-kVp X rays. The contribution of OH-radical action was reduced from about 55% in aerobic cells to about 20% in nitrogen-saturated cells. In nitrous oxide-saturated cells, the indirect effect attributable to OH. is about 35%. OH-radical-mediated lesions can therefore result in oxygen-independent as well as oxygen-dependent lesions. Our results show that the hydrated electron does not contribute significantly to radiolethality in anaerobic cells.

21975 Associations between tumor types in irradiated BALB/c female mice. Storer, J.B. (Oak Ridge National Lab., TN). *Radiation Research;* **92**: No. 2, 396-404(Nov 1982). Contract W-7405-ENG-26.

Associations between pairs of 12 different tumor types were estimated for a population of over 3800 irradiated BALB/c female mice. The associations were adjusted for age and radiation dose. Of the 66 pairs of tumor types, 21 showed significant positive or negative associations. Of these, 8 were considered to be spurious, principally because one or both of the tumors was rapidly lethal, leading to an apparent negative association. Six of the remaining 13 significant associations involed tumors of endocrine organs or tumors known to be endocrine related. Six others involved associations between lung, vascular tissue, or reticular tissue tumors, and tumors of endocrine organs. The remaining and highly negative association was between reticulum cell sarcomas and other lymphomas and leukemias. It was concluded that in irradiated female mice of this strain, at least, tumors are not independent and that alterations in host factors (principally endocrine) lead to animals developing both tumors (positive associations) or to one tumor but not the other (negative associations).

21976 Radiation sensitization and chemical studies on isoindole-4,7-diones. Infante, G.A. (Catholic Univ., Ponce, Puerto Rico); Gonzalez, P.; Cruz, D.; Correa, J.; Myers, J.A.; Ahmad, M.F.; Whitter, W.L.; Santos, A.; Neta, P. *Radiation Research;* **92**: No. 2, 296-306(Nov 1982).

Radiosensitization characteristics of newly synthesized isoindole-4,7-diones, and the chemical basis of their action, were studied. Rate constants and redox potentials for the one-electron reduction of these compounds were determined by pulse radiolysis. The values obtained resemble those of nitroimidazole derivatives and indicate that these new chemicals are potential radiosensitizers. This was confirmed by studies on the radiosensitization effects of the isoindolediones tested in vivo using soft tissue sacroma transplanted in mice. The results show a high level of radiosensitization by these compounds. The mechanisms of action of these new radiosensitizers are comparable to those of other electron-affinic sensitizers. It is anticipated that the compounds studied will provide a basis for the development of a new class of radiosensitizers.

21977 Radium-224 retention, distribution, and dosimetry in beagles. Lloyd, R.D.; Mays, C.W.; Taylor, G.N.; Atherton, D.R.; Bruenger, F.W.; Jones, C.W. (Univ. of Utah, Salt Lake City). *Radiation Research;* **92**: No. 2, 280-295(Nov 1982).

The retention, distribution, and dosimetry of injected ^{224}Ra were studied in six young adult beagles killed 0.04 to 7 days after ^{224}Ra administration. Biological retention of ^{224}Ra in the skeleton averaged 48% (37 to 60%), and soft-tissue retention decreased from 61% at 0.04 days to 6% at 7 days. At death there was more ^{212}Pb in red blood cells and liver than the amount in transient equilibrium with the ^{224}Ra in these tissues. There was an excess of 2^{12}Bi over ^{224}Ra in kidneys, and a deficiency of both 2^{12}Pb and ^{212}Bi relative to ^{224}Ra in eyes and bone. The retention equations derived from the data suggest that the fractional escape of ^{220}Rn produced in bone by ^{224}Ra decay was roughly 0.08. From the retention of ^{224}Ra, ^{212}Pb, and ^{212}Bi in the skeleton and selected soft tissues, it was calculated that the injection of 1 μCi ^{224}Ra/kg into an adult beagle having 75 g skeleton/kg body results in cumulative average doses to the blood-filled organs of 40 rad to the skeleton, 13 rad to the kidneys, 8 rad to the liver, 11 rad to the eyes, and 0.8 rad to the testes and ovaries.

21978 Tissue distribution and excretion of actinides absorbed from the gastrointestinal tract of rodents; and reply. Harrison, J.D.; Stather, J.W. (National Radiological Protection Board, Harwell (UK)); Sullivan, M.F. (Battelle Pacific Northwest Labs., Richland, WA (USA)). *Health Physics;* **43**: No. 2, 283-286(Aug 1982).

Letters to the editor.

21979 Estimation of radiation doses to the lungs of early uranium processing plant workers. Polednak, A.P. (Oak Ridge Associated Univ., TN); Keane, A.T.; Beck, W.L. *Environmental Research;* **28**: No. 2, 313-328(Aug 1982). Contract AC05-76OR00033.

Methods are described for the crude estimation of radiation doses to the lungs of workers in early uranium processing plants. Using data on selected plants, we estimated lung doses for groups of workers exposed to uranium dust alone, or in association with γ rays and radon gas derived from radium in uranium ores. Estimated 30-year lung doses for groups of chemical workers at a large uranium enrichment plant (in operation from 1943 to 1947) varied considerably, depending upon such factors as length of employment, types of uranium compounds, average air concentrations of uranium, and isotopic composition of the uranium. Some workers may have received lung doses as high as several hundred rem. The uncertainties in these crude dose estimates are described, along with the possible effects of host factors. Implications of these dose estimates for assessment of long-term health effects (i.e., lung cancer) are discussed, with reference to preliminary findings of mortality studies on workers at uranium processing plants.

21980 Studies with encapsulated ^{125}I sources. I. Apparatus and dosimetry for determination of relative biological effectiveness. Goldhagen, P.E.; Freeman, M.L.; Hall, E.J. (Columbia Univ., New York, NY). *International Journal of Radiation Oncology, Biology and Physics;* **8**: No. 8, 1347-1353(Aug 1982). Contract AC02-78EV04733.

Apparatus and dosimetry techniques have been developed which make possible studies of the biological effects of radiation from encapsulated ^{125}I sources at clinically relevant dose rates using mammalian cells attached to culture dishes. The variation of dose rate from ^{125}I photons as a function of distance from the interface between different materials was investigated. A polystyrene substrate changes the mean dose rate in attached cells by about 21%, depending on cell thickness. To reduce dosimetry uncertainty caused by this effect, special petri dishes were made from polyvinylidene fluoride, which changes the mean dose in attached cells by only 10%. Chinese hamster ovary cells attached to these dishes were cultured in incubators which contained ^{125}I and ^{137}Cs sources, allowing the effects of various dose rates (.005 to 0.80 Gy/hr) of radiation from the two isotopes to be compared. The relative dose rates from these low- and high-energy photons were measured with an accuracy of +/- 7% or better using an air-equivalent ionization chamber designed to resemble one of our special petri dishes. Calculations of dose rates from ^{125}I give values within 4% of the measured dose rates used to determine the relative biological effectiveness of ^{125}I photons.

21981 Studies with encapsulated ^{125}I sources. II. Determination of the relative biological effectiveness using cultured mammalian cells. Freeman, M.L.; Goldhagen, P.; Sierra, E.; Hall, E.J. (Columbia Univ., New York, NY). *International Journal of Radiation Oncology, Biology and Physics;* **8**: No. 8, 1355-1361(Aug 1982). Contract AC02-78EV04733.

Chinese hamster ovary (CHO) cells, in either exponential growth or unfed plateau phase were exposed to graded doses of radiation from Iodine-125 or from Cesium-137 at various dose-rates and the cells were assayed for reproductive integrity. From the patterns of cell survival obtained, the relative biological effectiveness (RBE) of the emission from ^{125}I was determined relative to ^{137}Cs. The RBE determined using cells in exponential growth was found to have a value of about 1.2, which was independent of the level of cell survival and did not vary over the dose-rate range from 7.5 to

53 cGy/hr. Using plateau phase cells the RBE has a constant value of about 1.3 between 13 to 46 cGy/hr, but is closer to 2.0 at lower dose-rates of 5 to 7 cGy/hr.

21982 **Modifications of the IRCP task group lung model to reflect age-dependence.** Crawford, D.J.; Eckerman, K.F. (Oak Ridge National Lab., TN (USA)). *Radiation Protection Dosimetry;* 2: No. 4, 209-220(1982).

The results of calculations on the age dependence of a variety of parameters appearing in the Task Group Lung Model of the ICRP are presented. In particular, information is given on the effect of age on regional deposition, removal by the mouth, retention in the tracheobronchial region following deposition on the mucociliary blanket, and traversal of the TB region by material deposited in the pulmonary region. All requisite calculations were performed with the use of a detailed age dependent lung model developed by the authors, with results averaged to ensure compatibility with the ICRP Task Group Lung Model.

21983 **Carcinogenesis following prenatal exposure to radiation.** Sikov, M.R. (Pacific Northwest Lab., Richland, WA). *International Journal of Biological Research in Pregnancy;* 2: No. 4, 159-167(1981). Contract AC06-76RL01830.

This review summarizes the literature dealing with postnatal development of tumors after prenatal exposure of laboratory animals to external radiation and to radionuclides. Many investigators have reported these exposures to be carcinogenic, some have not detected an effect, and still others observed decreased incidences of some tumor types. The resulting patterns of response suggest several pertinent biologic interactions that may be involved in the response elicited by prenatal irradiation.

21984 **Health effects from internally deposited radionuclides released in nuclear disasters.** McClellan, R.L.; Boecker, B.B.; Cuddihy, R.G.; Griffith, W.C.; Hahn, F.F.; Muggenburg, B.A.; Scott, B.R.; Seiler, F.A. (Lovelace Biomedical and Environmental Research Inst., Albuquerque, NM). pp 28-39 of Control of exposure of the public to ionizing radiation in the event of accident or attack. Reston, VA; National Council on Radiation Protection and Measurement (1981). Contract AC04-76EV01013.

A substantial amount of data exists on both early- and late-occurring effects of internally-deposited radionuclides in laboratory animals. These data, in combination with more limited human data, provide a basis for predicting the consequences of exposure to radionuclides released in a nuclear disaster. Many disasters could result in the release of numerous radionuclides; however, there are adequate exposure-health effect data on only a few specific radionuclides. Thus for risk estimation purposes, an approach is used that involves calculation of the dose to specific organs for a given exposure and then use of organ specific risk estimators for calculating the risks to individual organs. More than one radionuclide or form of radionuclides may be released in a nuclear disaster, and several organs may be exposed. Thus the need may arise to obtain an estimate of the individual's total risk. In obtaining such as estimate, it is important to sum only those effects that are of comparable severity and occur during the same time period, i.e., it would be inappropriate to sum the risk of pulmonary fibrosis and the probability of late-occurring death from lung cancer from radionuclides deposited in the lung.

21985 **Risks of radiation: induced lung cancer.** Cuddihy, R.G. (Lovelace Biomedical and Environmental Research Inst., Albuquerque, NM). pp 133-151 of Critical issues in setting radiation dose limits. Washington, DC; National Academy of Sciences (1981). Contract AC04-76EV01013.

From 17. annual meeting of the National Council on Radiation Protection and Measurements; Washington, DC USA (8 Apr 1981).

The risk of developing lung cancer after exposure to ionizing radiation has been studied extensively in people and in laboratory animals. The studies of human populations include survivors of the nuclear weapons used in Hiroshima and Nagasaki, medical patients with ankylosing spondylitis who received x-ray treatments and several groups of underground uranium and hardrock miners. The atomic bomb survivors and spondylitis patients received high dose-rate external exposures to either neutron and gamma radiations or x-rays over major portions of their bodies. The underground miners mainly received chronic alpha irradiation of their bronchial airway epithelium. At the present time, little information is available on lung cancer risks in people who inhaled radioactive particles that resulted in prolonged irradiation of the parenchymal lung tissues. The objective of this report is to use the results of studies performed in laboratory animals that inhaled radioactive aerosols as a means of extending the information obtained from studies in humans to project lung cancer risks from different types of radiation exposures.

5602 Thermal Effects

REFER ALSO TO CITATION(S) 21853, 21906

21986 **(PB—82-258062) Biological responses of the american oyster 'Crassostrea virginica' (gmelin) to thermal effluent in the Chesapeake-Delaware Bay area. Final report.** Tinsman, J.C.; Maurer, D.; Pennachi, K.A. (Delaware Univ., Lewes (USA). Coll. of Marine Studies). Jan 1981. 107p. NTIS, PC A06/MF A01.

This report presents the results of a 1979 study of various aspects of the life history of the oyster, Crassostrea virginica, and the effects of temperature-salinity interactions in the mid-Atlantic region. The study was intended to provide input to power plant siting decisions in the Chesapeake Bay area. Eighteen collections of planted oysters were made from effluent and control stations of two power plant sites in the mid-Atlantic region. Oyster mortalities were related to physical extremes at both sites, but were higher at PEPCO. Shell growth was evident at DPL, but not at PEPCO.

21987 **Energy partitioning in largemouth bass under conditions of seasonally fluctuating prey availability.** Adams, S.M.; McLean, R.B.; Parrotta, J.A. (Oak Ridge National Lab., TN). *Transactions of the American Fisheries Society;* **111**: No. 5, 549-558(Sep 1982). Contract W-7405-ENG-26.

Allocation of consumed energy by largemouth bass Micropterus salmoides into their major physiological processes was determined to investigate mechanisms by which these predators maintain condition (overall health) in a system with a seasonally fluctuating prey base. Consumed energy is partitioned into growth, energy storage, and gonads according to temporal prey availability, metabolic demands, and reproductive needs. Throughout minimum-feeding periods in the winter and early spring, largemouth bass utilize energy from visceral fat and body protein for standard metabolic demands and gonad development. Catabolism of energy from body tissue during the winter was less than 33% of standard metabolic demands, indicating that some consumption had to occur during the winter. The calculated activity metabolism of largemouth bass ranged from 18 to 144% of standard metabolism depending on time of year and sex. Parallel trends of activity metabolism and consumption over the year suggest that foraging costs may constitute a large fraction of activity metabolism. To maintain condition in a system where their primary prey undergoes large fluctuations in seasonal abundance, largemouth bass maximize caloric growth in the fall, store visceral fat, minimize standard and active metabolic demands, and undertake some winter feeding in warm thermal areas.

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REFER ALSO TO CITATION(S) 19666, 19667, 19667, 19738, 20255, 21747, 21819, 21825, 21861, 21884

21988 **(AD-A—115053/1) Position paper: the toxic effects of chronic exposure to low levels of carbon dioxide. Interim report.** (Naval Submarine Medical Center, Groton, CT (USA). Submarine Medical Research Lab.). 19 Jan 1982. 46p. (NSMRL—973). NTIS, PC A03/MF A01.

Numerous patrol studies have provided a sizable data base of levels of CO2 exposure and health problems encountered by Naval nuclear submariners. Humans have been exposed to a variety of concentrations of CO2 for chronic periods of time aboard submarines, as well as in laboratory environments. Mean data, PICO2 = 10 torr and 40 days, collectively represent this wide variety of CO2 exposures. >Physiological responses to the CO2 environment were repeatedly documented, but toxic effects were not apparent.< Human exposures were safely conducted in atmospheres containing up to 5 torr CO2, for up to 90 days. Such exposures are therefore considered safe at this time. Animal studies showed that chronic, low-level, CO2 exposures caused changes of the bone content of CO2, the bone content of calcium, the soft tissue content of calcium, and histological changes of the lung. These changes were found to be completely reversible upon discontinuance of the animal's exposure to CO2. >The extrapolation of the animal data to humans is a current problem in the advancement of our understanding of the effects of CO2 on humans.<.

21989 (CONF-820275—2) **Effects of air pollutants on corn.** Kress, L.W. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 13p. NTIS, PC A02/MF A01. Order Number DE83007637.

From Workshop on effects of air pollution on farm commodities; Washington, DC, USA (17 Feb 1982).

The effects of O_3, SO_2, HF, and NO/sub x/ on field corn (Zea mays L.) are reviewed. Research needs and strategies for damage amelioration are discussed. (ACR)

21990 (CONF-821071—2) **Potentially hazardous air contaminants in the home.** Woodring, J.L. (Argonne National Lab., IL (USA)). 19 Oct 1982. Contract W-31-109-ENG-38. 42p. NTIS, PC A03/MF A01. Order Number DE83007826.

From 70. annual national safety congress and exposition; Chicago, IL, USA (19 Oct 1982).

The health concerns of several substances likely to be encountered in the non-industrial indoor environment are discussed. Monitoring data and information on the health effects of CO, NO_2, formaldehyde, and radon are included. (JGB)

21991 (CONF-830216—1) **Dendroecological analysis of forest growth responses.** McLaughlin, S.B.; Blasing, T.J.; West, D.C. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 8p. NTIS, PC A02/MF A01. Order Number DE83007506.

From Acid rain program review meeting; Raleigh, NC, USA (21 Feb 1983).

In a study designed to determine if productivity of forests in the eastern US has been affected by increased atmospheric pollution of recent decades, tree rings measurements are being made. The survey involves collection and analysis of increment cores from approximately 500 trees at each of 12 study sites, representing wide variations in soil characteristics and pollution histories. Initial progress is summarized. (JGB)

21992 (CONF-8103155—, pp 147-160) **Effects of digested sewage sludge on the heavy metal concentrations in various vegetable species.** Rasp, H.; Siegel, O. 1981. (In German). NTIS (US Sales Only), PC A06/MF A01.

From 17. meeting on municipal composts and food quality; Speyer, F.R. Germany (26 Mar 1981).

During the period of 1972-1974 increasing quantities of anaerobically and aerobically digested sewage sludge from Blaubeuren were administered on a test field of the LUFA, Speyer, to red cabbage, tomatoes, carrots, and onions. As the evaluation of the test shows, the yield of the planted cultures is not necessarily determined by the amount and type of composted sludge. The ground improving effect of the composts has obviously also an influence on the yields. A comparison of the yields of the individual vegetable sorts with the concentrations of cadmium, copper, and zinc showed no clear relation. The concentrations of the heavy metals mentioned above change relatively strongly within the individual years and independent of the amount of the composts.

21993 (DE—82-000154) **Radiological and environmental research 1980: ecology.** (Argonne National Lab., IL (USA)). Jul 1981. 131p. NTIS, PC A07/MF A01.

Field grown and greenhouse grown soybeans are studied to determine the effects of sulfur dioxide, nitrogen dioxide, ozone, etc. on their crop yield. The effects of radioactive wastes on the Lake Michigan and its ecology are also studied.

21994 (DOE/EV/04329—2) **Response of native plant individuals and communities to elevated CO_2. Progress report 1982.** Bazzaz, F.A. (Illinois Univ., Urbana (USA)). 1982. Contract AC02-77EV04329. 8p. NTIS, PC A02/MF A01. Order Number DE83007896.

Research progress is reported in the following areas: (1) the effect of elevated CO_2 on competitive interactions of a community of annuals under high and low light intensities; (2) competitive interactions of soybean/Abutilon and soybean/Amaranthus at different levels of carbon dioxide and soil nutrient level; and (3) the response of two tree assemblages to CO_2 concentrations. (ACR)

21995 (DOE/EV/10100—T2) **Final progress report on carcinogenic agents.** Borek, E. (AMC Cancer Research Center and Hospital, Lakewood, CO (USA)). 1983. Contract AC02-79EV10100. 5p. NTIS, PC A02/MF A01. Order Number DE83007327.

The aim was to study the mechanism of action of some carcinogenic agents which do not react with DNA. The only common factor is that they elevate the progesterone level in the blood of the target animal. Two highly significant mechanisms have been found which may relate to the carcinogenic activity of such compounds: (1) the accumulation of methyl-1 deficient poly A-containing mRNA on administration of ethionine to rats; and (2) the effect of the tumor promoter 12-0-tetradecanoyl-phorbol-13-acetate (TPA) on tRNA methyltransferases. (ACR)

21996 (GSF-BPT—2/81, pp 185-189) **Action of environmental chemicals on the primary processes of photosynthesis.** Renger, G.; Graeber, P. May 1981. (In German). NTIS (US Sales Only), PC A10/MF A01.

From 2. seminar of the Gesellschaft fuer Strahlen- und Umweltforschung; Neuherberg, F.R. Germany (27 Oct 1980).

Starting from the observed inhibition of electron transport, the experiments aimed to localize the site of action of diphenylamine derivatives. In order to test an eventual analogy to DCMU action, the influence of chloroplastene treatment with trypsin was investigated. The resulting O_2 formation rates show differing influences on the inhibitor action for various derivatives. By the employed method of measuring fluorescence induction curves, it is possible to detect noxious actions within the plant leaf in situ.

21997 (Juel-Spez—163, pp 20-41) **Development and proof-testing of a method for assaying the bio-degradibility of organic substances under anaerobic milieu conditions.** Wagner, R.; Braeutigam, H.J. Jul 1982. (In German). NTIS (US Sales Only), PC A08/MF A01.

In Methods for the ecotoxicological evaluation of chemicals. Vol. 1.

The test is carried out by precultivating anaerobic digestion media under standardized conditions, adding systematically increasing amounts of the test substance to them and then treating the resulting mixtures anaerobically at 30°C for 21 to 28 days under steady agitation. During the test period the amount of gas generated and its composition are determined. Conclusions as to the toxic effects or anaerobic biodegradability of the test substance are arrived at by considering the extent to which gas generation is inhibited or enhanced resp. Nonmodified carbohydrates (glucose, maltose, cellulose, starch) proved themselves to be easy to degrade anaerobically. Chemically modified polysaccharides (carboxymethyl starch, carboxymethyl cellulose, hydroxyethyl cellulose) gave results indicating that with increasing degrees of etherification their anaerobic biodegradation is rendered increasingly difficult. From the reference chemicals tested, aniline, 4-chloroaniline, dichlorophynoxy acetic acid, 2-nitrophenol and 4-nitrophenol proved themselves to be anaerobically non-biodegradable. Moreover 2-nitrophenol and 4-nitrophenol acted as strongly toxic agents. Both methanol and phenol were subject to anaerobic bio-degradation after a lag-phase.

21998 (Juel-Spez—163, pp 42-63) **Study of the physiological effects of pollutants in carp.** Hanke, W.; Bittner, A.; Horn, G.; Mueller, R.; Keppler, R. Jul 1982. (In German). NTIS (US Sales Only), PC A08/MF A01.

In Methods for the ecotoxicological evaluation of chemicals. Vol. 1.

Investigations about the influence of two groups of pollutants on physiological parameters of carps were performed. The first group consisted of extreme toxic pollutants like atrazin, HCB, DDT and PCP. The general pollutants as phenol, methanol, chloroform and urea belonged to the second group. Determinations of osmolality and electrolyte content of blood plasma clearly showed that a weak intoxication results in an increase of osmolality and Na concentration. Severe intoxication was indicated by a decreasing osmolality and Na concentration while the K content increased. In the case of urea, special changes occurred because of the uptake of this compound into the body. For a short time, plasma glucose increased under the influence of pollutants. The glycogen content of the liver was also firstly augmented. Severe intoxication resulted in a decrease of plasma glucose and liver glycogen. The whole complex is interpreted as stress phenomenon. Under the influence of atrazin, the amount of red blood cells decreased whereas azurophilic granulocytes increased. Further on, lytic stages of erythrocytes were often found. The use of further physiological tests for the proof on pollutants is discussed.

21999 (Juel-Spez—163, pp 64-73) **Development and verification of a behavior test of fishes in flowing water for assessment of subacute and chronic toxicity, as well as study of influencing factors.** Bemmer, P. Jul 1982. (In German). NTIS (US Sales Only), PC A08/MF A01.

In Methods for the ecotoxicological evaluation of chemicals. Vol. 1.

A method was developed and tested employing the banded cylinder technique to help in the early diagnosis and evaluation of sub-lethal and chronic injury caused by chlorinated hydrocarbons in fish. The banded cylinder device was continually improved technically during the entire course of the investigation as experience was gained. The following parameters could be varied: the pattern used as a stimulus and its speed of rotation, the direction of rotation, the width of the swimming channel, the concentration of the contaminants in the water, and the water temperature. Several fish species were used in the experiments: ide (Leuciscus idus (L.), carp (Cyprinus carpio L.), minnows (Phoxinus phoxinus (L.) and trout (Salmo gairdneri Richardson). The movements of the fish were recorded automatically using the magnetic marking method. Although several different experimental procedures were employed, none could be found that provided reproducable results and showed promise of becoming a standard method. The reason seems to be that there is too much variability among the reactions of individual fish to a visual stimulus to use this parameter for the quantitative evaluation of sublethal injury or intoxication.

22000 (Juel-Spez—163, pp 74-94) **Development and verification of a fish test in flowing water for comparable quantification of biological accumulation and the impacts of influencing factors.** Langer, D.; Schuetz, W. Jul 1982. (In German). NTIS (US Sales Only), PC A08/MF A01.

In Methods for the ecotoxicological evaluation of chemicals. Vol. 1.

Investigations on the accumulation and elimination of hexachlorobenzol, lindane, pentachlorophenol, dioctylphthalate, trichloroethylene and trichlorobenzol were conducted using ide, trout, carp, and minnows as experimental animals. The concentrations of the chemicals rapidly decreased in static test systems, so a flow-through system and dosage regulator were developed to hold the experimental parameters constant. This also permitted long-term experiments. The contaminant was applied either in the water or in the food. The following conclusions were reached: - Storage and elimination of the substance applied are to a great extent dependent on the fat content of the animal. - Whether the contaminants were administered with the water or with the food, an accumulation plateau was reached, dependent upon the specific qualities of the chemicals. - A general correlation between the distribution of the contaminant among the organs and their fat content was observed. - A general agreement between the results obtained using isolated train-oil and living fish indicated that the distribution of the contaminants can be described as an equilibrium between two phases.

22001 (Juel-Spez—163, pp 95-110) **Acute and chronic effects of selected substances of the EC 'black list' on representative freshwater animals.** Schreiber, I.; Besch, W.K. Jul 1982. (In German). NTIS (US Sales Only), PC A08/MF A01.

In Methods for the ecotoxicological evaluation of chemicals. Vol. 1.

The readiness of Hydropsyche larvae to weave catching nets was lowered by 24 and 48 hs exposure to 100 and 200 mg Trichlorethylen. 24 hs treatment with the same substance followed by 24 hs recovery led to a stimulation of weaving and improved net quality. 500 μg Hg/l (as $HgCl_2$) and 5 mg Phenol/l reduced the numbers of net spinning larvae. Using the same individuals as their own controls by comparing pre- and post treatment nets the threshold concentration of $HgCl_2$ could be lowered by more than 50%. After exposure to 50 and 100 mg Phenol/l some larvae lost their capacity to orientate their catching nets in respect to the water current. The Hydropsyche net weaving test is very informative but at the same time very time consuming.

22002 (NP—3901015) **Uptake and fate of Cd and Zn in edible fungi of the Agaricus bisporus species.** Huetter, M. (Duesseldorf Univ. (Germany, F.R.). Medizinische Fakultaet). 1979. 51p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83901015.

Thesis.

Cd and Zn were added to growth substrate of fungi in order to investigate the Cd uptake and the effects of Zn on Cd uptake in the edible fungus Agaricus bisporus. Fungus yields were found to decrease with Cd uptake. This effect was completely overcome and sometimes even overcompensated by adding zinc. Cd concentrations in the fungi increased with the soil Cd concentration: When Cd (5.0 and 10.0 mg/kg Fg) was added to the soil cover as well as to the substrate, Cd concentrations in the fungi were found to be about 70% higher than in fungi where the same amount of Cd had been added only to the substrate. The following interactions between Cd and Zn uptake were observed: Low soil Cd concentrations enhance Zn uptake. In contrast, Zn enhances Cd uptake in fungi with low Cd concentrations. At high soil Cd concentrations, Zn inhibits Cd uptake. Cd concentrations in the fungi increased with the age of the cultures and with the size of the fungi. The highest concentrations were found in the lamellae. The enrichment factors are lower in the cultivated variety (0.6 to 1.4 in dependence of the soil Cd concentration) than in wild-growing fungi.

22003 (PB—80-157217) **Effects of sulfuric acid rain on two model hardwood forests: throughfall, litter leachate, and soil solution.** Lee, J.J.; Weber, D.E. (Environmental Protection Agency, Corvallis, OR (USA). Environmental Research Lab.). Jan 1980. 50p. (EPA—600-3-80-014). NTIS.

Simulated sulfuric acid rain (pH 3.0, 3.5, 4.5, and 5.6) was applied to model forests containing either sugar maple (Acer saccharum) or red alder (Alnus rubra). Water samples were collected above and below the canopy, below the litter, and from 20 cm and 1 m below the surface of the soil. While throughfall chemistry was not very different from rain chemistry, the litter leachate (the actual input to the soil) had consistently higher concentrations of calcium and magnesium, and higher pH than the acid rain. For the first 6 months, sulfate absorption by the soil prevented any apparent differences in sulfate, calcium, or magnesium concentrations in the 20-cm soil solution among plots receiving acid or control rain treatments. Sulfate concentrations on plots receiving the most acid rain (pH 3.0) then became increasingly higher than on the other plots until after 3 years, they were approximately equal to sulfate concentrations in the rain. Twenty-cm soil solutions corresponding to the pH 3.5 and 4.0 treatments responded similarly starting respectively 1 year and 2 years after initiation of exposure to acid rain. Increased calcium and magnesium concentrations and lowered pH in 20-cm soil solution occurred simultaneously with increased sulfate concentrations. No acid rain related effects were evident in the 1-m soil solution even after 3.5 years exposure to pH 3.0 sulfuric acid rain. Cation responses to increased anion concentrations followed those predicted by a computer-simulation model. However, sulfate concentrations in 20-cm soil solutions increased considerably faster than predicted by a Langmuir formulation of sulfate absorption.

22004 (PB—82-196403) Megration of low molecular weight additives in poluolefins and copolumers. Final report. Chang, S.S.; Senich, G.A.; Smith, L.E. (National Bureau of Standards, Washington, DC (USA)). Mar 1982. 259p. (NBSIR—82-2472). NTIS, PC A12/MF A01.

Food packaging is an inseparable part of modern life. Any substance that migrates from the packaging material into foods is viewed as indirect food additives. In connection with toxicological knowledge, it is important to know the amount of such indirect food additives expected to be present in the food during storage and processing. This program, sponsored by the Bureau of Foods of the Food and Drug Administration is to provide theoretical models, reliable data base, methodology to study the migration phenomena and to provide reasonable worst-case estimates for the concentrations of the indirect additives in food. In this final report, the authors present the results of approximately 250 completed migration experiments based on radiotracer techniques on the migration of low molecular weight hydrocarbons and antioxidants from polyethylene, polypropylene and ethylene-vinyl acetate copolymers. Results of a study for the determination of relative diffusion coefficients of several probe molecules in the polyethylene melt by inverse gas chromatography are also presented. Based on these studies, ethanol appears to be a far more reasonable food-oil stimulating solvent than n-heptane. Other pure or mixed triglycerides may also be considered as food-oil simulating solvents, however they may pose the same analytical difficulties as that of the food oil itself.

22005 (PB—82-241795) Sensitivity analysis on Coburn model predictions of COHB levels associated with alternative CO standards (EPA staff paper). (Environmental Protection Agency, Research Triangle Park, NC (USA). Office of Air Quality Planning and Standards). Jul 1980. 32p. NTIS, PC A03/MF A01.

In the June 1, 1979 draft staff paper presented to the Clean Air Scientific Advisory Committee, EPA included a table depicting carboxyhemoglobin (COHb) responses to CO exposures as predicted by the Coburn Model. This table presents baseline or nominal estimates of the COHb levels expected to be achieved by nonsmokers to constant CO concentrations for 1 to 8 hours. Uncertainties exist, however, in using these estimates to decide which standards provide an adequate margin of safety. First, even among normal person variations exist in the physiological parameters used in the Coburn model. These variations are sufficient to provide noticalbe deviations from the COHb levels that were predicted using normal parameters. Even more substantial variations in these parameters are observed in population groups such as anemics that may be more sensitive to CO exposure. Second, predictions based on exposure to constant CO concentrations inadequately represent the response of individual exposed to widely fluctuating concentrations that typically occur in ambient exposure situations. An attempt was made to represent these uncertainties by performing a sensitivity analysis unsing the Coburn model in a dynamic mode to predict the COHb responses to specific patterns of fluctuating ambient concentrations of CO for individuals with physiological parameters different from the baseline values. The results of this analysis are given.

22006 (PB—82-258591) Impact of air pollution on vegetation near the Columbia Generating Station - Wisconsin power plant impact study. Tibbitts, T.W.; Will-Wolf, S.; Karnowsky, D.F.; Olszyk, D.M. (Wisconsin Univ., Madison (USA). Inst. for Environmental Studies). Jun 1982. 228p. NTIS, PC A11/MF A01.

The impact of air pollution from the coal-fired Columbia Generating Station upon vegetation was investigated. Air monitoring of 03 and 02 documented levels that occurred before and with operation of the generating station. Field sampling of alfalfa, lichens, and white pines was undertaken before and after initiation of generating station operations. Controlled environmental exposures were undertaken with separate cultivars of crop species grown in the vicinity of the generating station. Alfalfa, carrots, mint, peas, beans, and trembling aspen were exposed to SO2 and O3 to establish minimum threshold pollutant levels for injury from these pollutants.

22007 (PB—83-137224) Industrial hygiene survey of the General Electric Company, Hudson Falls, New York, Fort Edward, New York. Report for Jun 76-Apr 77. Jones, M. (National Inst. for Occupational Safety and Health, Cincinnati, OH (USA). Div. of Surveillance, Hazard Evaluation and Field Studies). 6 Jan 1973. 24p. NTIS, PC A02/MF A01.

Worker exposures to polychlorinated-biphenyls (1336363) (PCB), lead (7439921), tin (7440315), zinc (7440666), toluene (108883), methyl-isobutyl-ketone (108101) (MIBK), trichloroethylene (79016), aluminum (7429905), and iron (7439896) were determined at the General Electric Company (SIC-5065) in Hudson Falls, and Fort Edward, New York, on June 21 to 28, 1976, and on April 27 to 28, 1977. The survey was part of a NIOSH study of the health effects of occupational PCB exposure. The author recommends improved ventilation in the impregnation, soldering, and repair areas, and improved work practices or engineering controls to prevent vapors from escaping the degreaser unit.

22008 (PNL-SA—11110) Inhalation exposure study of a solvent-refined-coal material. Springer, D.L.; Mahlum, D.D.; Ragan, H.A. (Pacific Northwest Lab., Richland, WA (USA)). Feb 1983. Contract AC06-76RL01830. 22p. (CONF-821172—1). NTIS, PC A02/MF A01. Order Number DE83007843.

From 13. annual conference on environmental toxicology; Dayton, OH, USA (16 Nov 1982).

An evaluation of the toxicologic effects of solvent refined coal (SRC) material has been exended to include an inhalation exposure study. The material selected for this study was heavy distillate (HD), the 550 to 850°F fraction from the SRC-II process, obtained from the pilot plant at Ft. Lewis, Washington which is operated by the Pittsburgh and Midway Coal Mining Co. Results indicate that exposure to HD at 0.7 and 0.14 mg/L caused a significant alteration in growth for male and female rats; however, at 0.03 mg/L very little effect was observed. Even though body weight gain was severely depressed for animals in the high-exposure group, 94% of these rats survived the 13 wk of exposure. Most deaths occurred during the last 3 wk of the exposure. A complete necropsy (approximately 35 tissues) was performed at the end of each exposure including weights of heart, liver, lung, spleen, thymus, brain, kidneys, adrenals, and gonads. Results are presented.

22009 Effects of NO_2 on immune responses in pulmonary lymph of sheep. Joel, D.D.; Chandra, P.; Chanana, A.D. (Brookhaven National Lab., Upton, NY). *Journal of Toxicology and Environmental Health;* **10**: No. 2, 341-348(Aug 1982). Contract AC02-76CH00016.

Sheep in which the efferent duct of the caudal mediastinal lymph node was cannulated were exposed to 5 ppm NO_2, 1.5 h/d for 10 or 11 d. Immune responses were assessed by measuring the daily output of hemolytic plaque-forming cells (PFC) in pulmonary lymph, following intrabronchial immunization with horse red blood cells (HRBC) and phytohemagglutinin- (PHA) induced transformation of blood and pulmonary lymph lymphocytes. Sheep immunized 2 d after termination of NO_2 exposure had reduced outputs of PFC as compared to those seen in sheep challenged 4 d after NO_2 exposure. Animals immunized 4 d after NO_2 exposure had outputs similar to those of air control sheep.A reduction of 38-87% in the transformation index of both blood and pulmonary lymph lymphocytes was observed in sheep exposed to NO_2. These results suggest that intermittent, short-term exposure to 5 ppm NO_2 may temporarily alter pulmonary immune responsiveness.

22010 Lung function and morphology of dogs after sublethal exposure to nitrogen dioxide. Johnson, W.K.; Mauderly, J.L.; Hahn, F.F.; Muggenburg, B.A. *Journal of Toxicology and Environmental Health;* **10**: No. 2, 201-221(Aug 1982). Contract AC04-76EV01013.

The relationship between respiratory function and morphological changes in 10 dogs exposed for 6 h to 69 ppm nitrogen dioxide was studied. Two additional dogs served as controls. Functional assessments included breathing pattern, breathing mechanics, forced expiration, gas exchange, and acid-base status. Gross, microscopic, and ultrastructural evaluations were made of lung tissues from dogs killed at 0.1, 1.0, 2.0, 3.0, 7.0 and 14.0 d after exposure. Functional changes were similar to those reported for man. The principal dysfunction was gas-exchange impairment, apparently resulting from foam in the airways. Breathing-pattern alterations appeared to result from stimulation of neural receptors. Gas-exchange measurements provided the most useful indicators of the pulmonary damage observed in this study.

22011 **Electrical determination of viability in saline-treated mouse myeloma cells.** Matsushita, T.; Brendzel, A.M.; Shotola, M.A.; Groh, K.R. *Biophysical Journal;* **39**: No. 1, 41-47(Jul 1982). Contract W-31-109-ENG-38.

Suspension of mouse myeloma cells in phosphate buffered saline (PBS) induced a significant amount of cell death. The lethal effects of PBS include an increase in cell lysis, a decreased ability of cells to exclude trypan blue, and a decrease in the colony-forming ability of these cells. Dead cells were also detected on a Coulter counter by the increase in the fraction of cells with a smaller electrical size distribution (ESD). Comparing mixtures of live and dead cells by ESD and trypan-blue exclusion showed a high correlation of electrical size with viability (correlation coefficient = 0.98). Sizing of PBS-treated cells by light microscopy suggested that the altered ESD of the PBS-treated cells was due to a downward shift in the volume distribution. Light-scattering experiments also suggested a decrease in the size of cells after PBS treatment. An increase in permeability of the cell membrane may also contribute to these results. We conclude that electrical sizing is an excellent indicator of physical changes that result from PBS-induced cell death, and is an effective method for distinguishing live and dead mouse myeloma cells after PBS treatment.

22012 **Effects on rat lung immunity by acute lung exposure to benzo(a)pyrene.** Schnizlein, C.T. (Medical Coll. of Virginia, Richmond); Bice, D.E.; Mitchell, C.E.; Hahn, F.F. *Archives of Environmental Health;* **37**: No. 4, 201-206(Jul 1982). Contract AC04-76EV01013.

This study describes the effect of intratracheal instillation of benzo(a)pyrene (BaP) on immunological responses in the lung-associated lymph nodes, cervical lymph nodes, and spleen after deposition of 10^8 sheep red blood cells (SRCB) in the lung or peritoneal cavity of rats. An increased number of anti-SRBC antibody-forming cells was observed in the lung-assoicated lymph nodes when rats were immunized simultaneously with BaP instillation. A suppression in the number of anti-SRBC antibody-forming cells occurred when SRBC were given intratracheally 4 or 7 days after BaP. The effects of the BaP appeared to be on the function of the cells in the lung-associated lymph nodes rather than due to changes in the exposed lung. BaP-induced changes in antigen handling or in regulatory populations of immune cells in the lung-associated lymph nodes may be responsible for the immune alterations observed.

22013 **Germination and growth effects of hexavalent chromium in Orocol TL (a corrosion inhibitor) on Phaseolus vulgaris.** Parr, P.D.; Taylor, F.G. (Oak Ridge National Lab., TN). *Environment International;* **7**: No. 3, 197-202(1982). Contract W-7405-ENG-26.

This research was designed to address the potential for germination and growth effects in bush beans (Phaseolus vulgaris L. var. Bush Blue Lake) from hexavalent chromium in Orocol TL, a proprietary chromated, zinc-phosphate compound added to DOE cooling water systems for corrosion inhibition. Studies were conducted at low and high Orocol TL concentrations in the soil by adjusting soil pH and the percent of organic matter. Germination effects were determined for seeds germinated in soils adjusted to differing pH ranges (4-4.5, 5-5.5, and 6.5-7), levels of organic matter (1.8%, 3%, and 5%), and Orocol TL amendments (control of 0, 10, and 500 μg/g chromium). Growth responses (effects) were determined from plants cultured in the same soil treatment combinations as described for the germination study. High levels (500 μg/g) of hexavalent chromium in soil (as Orocol TL) affected germination and growth, while a high level of organic matter significantly reduced chromium toxicity on germination. At lower chromium concentrations there was significant uptake by all plant parts, with a corresponding reduction in biomass of leaves. Consequently, adjustments of soil pH from 4.0 to 7.0 appear to have no significant effect on chromium uptake in plants. Increasing the organic matter level to 5%, while decreasing the toxicity of high chromium levels to germinating seed, did not affect chromium uptake.

22014 **Extrapolation of mutagenicity testing to the human.** Mendelsohn, M.L. (Lawrence Livermore National Lab., CA). pp 113-116 of Genetic toxicology. Fleck, R.A.; Hollaender, A. (eds.). New York, NY; Plenum Publishing Corp. (1982).

The author raises questions concerning the use of chemicals in agriculture and the problems of environmental carcinogenesis. There is a need for tests which are sufficiently broad enough to identify all types of relevant genetic damage and sufficiently redundant to control false alarms. The relationship of mutagenesis and carcinogenesis is discussed. Scientists lack the technical skill to measure induced heritable mutation in man. The development of such tests will be a breakthrough. The author believes a data base containing a somatic mutagenicity profile on each new cancer patient would answer questions concerning the relationship between carcinogenesis and mutagenesis. Eventually the problem of mutagenic vectors in agriculture would be solved using appropriate testing methods. (RJC)

22015 **Cytochrome P_{450} dependent monooxygenases in nasal epithelial membranes: effect of phenobarbital and benzo(a)pyrene.** Hadley, W.M.; Dahl, A.R.; Benson, J.M.; Hahn, F.F.; McClellan, R.O. (Lovelace Inhalation Toxicology Research Inst., Albuquerque, NM). *Proceedings of the Western Pharmacology Society;* **25**: 197-199(1982). Contract AC04-76EV01013.

The cytochrome P-450 content of microsomes isolated from nasal membranes, lungs, and livers of the mouse, rat, guinea pig, hamster, rabbit, and dog was measured. The cytochrome P-450 dependent monooxygenase activity (MO) was assayed in microsomes from dog nasal membrane, lung, and liver using aniline, p-nitroanisole, aminopyrine and hexamethylphosphoramide (HMPA) as substrates. Phenobarbital was administered as a saturated drinking water solution for 8 days or as an aerosol for 30 minutes on 4 successive days. Benzo(a)pyrene was administered as an aerosol for 1 h on 4 successive days. The drinking water was removed 12 h before sacrifice and the last aerosol exposure was 24 h before sacrifice. All species nasal membranes contained cytochrome P-450. The hamster nasal membranes contained the highest concentrations. All substrates used were metabolized (as measured by MO activity) by the nasal membrane microsomes except for aminopyrine by the maxilloturbinate microsomes. HMPA was the most rapidly metabolized substrate. Liver cytochrome P-450 was induced more than 2 times by the phenobarbital administered in the drinking water, but no induction of nasal membrane cytochrome P-450 was found. Neither the phenobarbital nor benzo(a)pyrene aerosols induced the liver, lung, or nasal membrane cytochrome P-450 content. (RJC)

22016 **Inhibition of rat nasal cytochrome P-450-dependent mono-oxygenase by the essence heliotropin (piperonal).** *Drug Metabolism and Disposition;* **10**: No. 5, 553-554(1982). Contract AC04-76EV01013.

The purpose of this study was to determine if heliotropin can inhibit cytochrome P-450 mediated oxidations in both nasal and hepatic microsomes. Heliotropin was an effective inhibitor of the methylation of the common fragrance dimethyl anthranilate by nasal microsomes; little inhibition was observed in liver microsomes. If the strong inhibitory activity of heliotropin in the nose occurs in vivo, then the inhalation of heliotropin prior to or along with inhalation of other airborne substances might profoundly alter the biological fate of those substances. (RJC)

22017 **Toxicological characterization of the process stream from an experimental low Btu coal gasifier.** Benson, J.M.; Hill, J.O.; Mitchell, C.E.; Newton, G.J.; Carpenter, R.L. (Lovelace Biomedical and Environmental Research Inst., Albuquerque, NM). *Archives of Environmental Contamination and Toxicology;* **11**: 363-371(1982). Contract AC04-76EV01013.

Samples were obtained from selected positions in the process stream of an experimental low Btu gasifier using a five-stage multicyclone train and a four-stage condenser train. These materials which represent potential fugitive emissions were screened for mutagenic activity (Ames Salmonella mammalian microsome mutagenicity assay) and for in vitro cytotoxicity (alveolar macrophages). Size-fractionated materials collected in the multicyclone train were mutagenic in Salmonella tester strains TA-98 and TA-100 and were also cytotoxic. There appeared to be no relationship between aerosol droplet size and mutagenic activity. Studies with condenser train samples indicate that neutral and basic polynuclear aromatic compounds contribute to the mutagenicity of process stream materials. Specific mutagenic and cytotoxic activity of material was reduced as gas underwent cleanup. A reduction in the mass loading of potentially toxic compounds is achieved by the control devices in the process stream of the experimental gasifier being developed and tested by METC, and assuming equal probability of emissions throughout the process stream, risk from exposure to potential fugitive emissions is reduced as the gas is cleaned.

22018 **Mutagenicity of potential effluents from an experimental low Btu coal gasifier.** Benson, J.M.; Mitchell, C.E.; Royer, R.E.; Clark, C.R.; Carpenter, R.L.; Newton, G.J. (Lovelace Biomedical and Environmental Research Inst., Albuquerque, NM). *Archives of Environmental Contamination and Toxicology;* **11**: 547-551(1982). Contract AC04-76EV01013.

Potential waste effluents produced by an experimental low Btu coal gasifier were assessed for mutagenic activity in Salmonella strain TA98. Cyclone dust, tar and water effluents were mutagenic, but only following metabolic activation. Neutral and polar polycyclic aromatics contributed significantly to mutagenic activity of Venturi scrubber water and tar. The results indicate that cyclone dust, tar, and water effluents of the experimental low Btu gasifier, as operated in 1979, contain mutagenic material. Potential health hazards associated with these materials should be considered in the design of future coal gasification facilities.

22019 **Potential health risks from increased use of diesel light duty vehicles.** Cuddihy, R.G.; McClellan, R.O.; Griffith, W.C.; Seiler, F.A.; Scott, B.R. (Lovelace Biomedical and Environmental Research Inst., Albuquerque, NM). pp 353-367 of Toxicological effects of emissions from diesel engines. Lewtas (ed.). New York, NY; Elsevier Science Publishing Co., Inc. (1982). Contract AC04-76EV01013.

Diesel light duty vehicles are expected to comprise 20% of the total light duty vehicle fleet in the United States within 15 years. Chemical analyses of diesel emissions have identified potentially toxic gases including nitrogen oxides and carbon monoxide along with particles that contain known carcinogenic compounds including polyaromatic hydrocarbons. Diesel particle extracts have been shown to be mutagenic to cells in culture, to cause cell transformations and to induce tumors in the skin of mice. Further studies have also shown that diesel particle extracts are not markedly different from extracts or condensates of cigarette smoke, coke oven emissions, or urban soot in their ability to cause these biological effects per unit mass. Atmospheric concentrations of particles emitted by diesel vehicles were projected for major cities in the United States using a computerized atmospheric dispersion model. This model predicted that with 20% diesel light duty vehicles the average city particulate pollution levels would increase by about 0.2 $\mu g/m^3$ over existing levels. The largest cities would be expected to have an overall increase of 1 to 2 $\mu g/m^3$ but in urban street canyons and parking garages diesel particles may add 20 to 30 $\mu g/m^3$ to the existing particulate concentrations. By using the results of previous epidemiological studies of smokers, coke oven workers and urban residents, we obtained an upper estimate of lung cancer risk that would be expected in people exposed to diesel exhaust particles.The risk estimator was taken to be 0.0015 cancers per year per mg/m^3 life-time exposure to diesel particles. Combining this risk factor with projected future air concentrations of diesel particles in urban environments, we estimated that less than 30 lung cancers per year could be related to the projected increased use of diesel light duty vehicles in the United States.

22020 **Cadmium as an etiologic factor in hypertension.** Ohanian, E.V.; Schlaechtelin, G.; Iwai, J. (Brookhaven National Lab., Upton, NY). pp 703-718 of Cadmium in the environment. Part II. Health effects. Nriagu, J.O. (ed.). New York, NY; John Wiley & Sons (1981).

The role of cadmium in experimental and human essential hypertension is discussed in this chapter. The discussion focuses on the conflicting results from different laboratories concerning the role of cadmium in experimental and human hypertensive disease, and on the nature of influences which determine differences in susceptibility to cadmium-induced hypertension in 2 unique lives of Long-Evans rats. (KRM)

5604 Other Environmental Pollutant Effects

REFER ALSO TO CITATION(S) 19666

22021 **(AD-A—115079/6) Possible effects of noise from offshore oil and gas drilling activities on marine mammals: a survey of the literature. Final report FY 80.** Turl, C.W. (Naval Ocean Systems Center, San Diego, CA (USA)). Jan 1982. 25p. (NOSC/TR—776). NTIS, PC A02/MF A01.

The acoustic environment in the area of offshore oil and gas drilling activities may influence the behavior of marine mammals. Increased noise levels may mask their acoustic signals. Offshore structures and the increased level of human activities in outer continental shelf areas could displace marine mammals from traditional feeding and breeding areas. No conclusions about the effects of noise on natural populations have been verified under controlled conditions.

22022 **(AD-A—115115/8) Dosimetric and behavioral analysis of microwave-drug synergistic effects on operant behavior in the rat. Final report Sep 79-Dec 81.** Lovely, R.H.; Lundstrom, D.L.; Phillips, R.D. (Battelle Pacific Northwest Labs., Richland, WA (USA)). 18 Dec 1981. 26p. NTIS, PC A03/MF A01.

Five male Long-Evans rats, maintained at 80% of their free-feeding weight, were trained to bar-press for food reward on a one-minute fixed-interval (FI1) schedule of reinforcement. Once stable FI1 baseline response rates were established, dose-response functions were generated for Chlordiazepoxide HC1 (CDZ). Subsequent treatments with CDZ were followed by 30 min. pulsed microwave radiation (MWR) and FI1 behavioral assessment. Pulsed MWR exposures were in the far zone of an anechoic chamber at an averaged incident power density of 1 mW/sq cm (PRF = 300/sec, 3 usec pulse width). After 2 replications of the combined treatments another CDZ dose-response function was generated. This was followed by 3 more CDZ and MWR replications the first of which was carried out at an averaged incident power density of 1 mW/ sq cm2 Increased rates of response for the CDZ and 1 mW/sq cm MWR treatment were demonstrated relative to initial CDZ dose-response functions in 4 of 5 rats tested. However, the dose-response functions for CDZ alone, that were generated following this apparent synergy showed the same shift in response rate. Furthur, the 8 mW/sq cm 2 pulsed MWR combined with CDZ also produced data similar to the 1 mW/sq cm post-MWR exposure CDZ dose-response functions for the animals tested. Thus, we were unable to replicate an earlier demonstration of synergy between CDZ and MWR.

22023 **(DOE/ER/10060—T1) Responses of airborne biota to microwave transmission from satellite power system. Final report.** (Little (Arthur D.), Inc., Cambridge, MA (USA)). 3 Jun 1982. Contract AI01-79ER10060. 430p. NTIS, PC A19/MF A01. Order Number DE83006495.

As part of an assessment of environmental impacts of the Satellite Power System (SPS), the behavioral responses of birds to microwave radiation was studied. Experiments were conducted in both field and laboratory environments. Molting, foraging behavior, reproductive behavior, embryonic development, and flight behavior were examined. (ACR)

22024 **(PB—83-138768) A second field investigation of noise reduction afforded by insert-type hearing protectors.** Edwards, R.G.; Broderson, A.B.; Green, W.W.; Lempert, B.L. (Watkins and Associates, Inc., Lexington, KY (USA)). Apr 1982. 67p. NTIS, PC A04/MF A01.

Field testing of noise reduction by earplugs was done. Ten factories and 280 employees took 1400 attenuation tests. User molded, expandable acoustic foam, custom molded, and acoustic wool types of earplugs were evaluated. Workers received protection ranging from about 9 decibels at 125 hertz to 29 decibels at 3150 hertz. Acoustic foam earplugs provided the best hearing protection, and acoustical wool, the least. The authors conclude actual noise protection depends on earplug design.

22025 (PB—83-139576) Industrial hygiene walk-through survey report on RF radiation exposures from heat sealers at Hazel Incorporated, Washington, Missouri. Cox, C.; Egan, B.; Herrick, B.; Murray, B. (National Inst. for Occupational Safety and Health, Cincinnati, OH (USA)). 7 Feb 1979. 21p. NTIS, PC A02/MF A01.

Worker exposures to radiofrequency (RF) radiation were determined at Hazel Incorporated (SIC-3161) in Washington, Missouri on November 20, 1978. The company was under consideration for inclusion in a NIOSH study of the health effects of occupational RF exposure. The authors conclude that this workforce should not be included in RF radiation hazard survey because of the small number of affected workers. They recommend that shields be added to the heat sealing presses to reduce worker exposures to RF radiation.

57 Health And Safety

REFER ALSO TO CITATION(S) 20652

58 GEOSCIENCES

22026 (N—8228689) US Geological Survey activities, fiscal year 1981. (Geological Survey, Washington, DC (USA)). 1981. 165p. (CIRC—875). NTIS, PC A08/MF A01.

Activities in Alaska, Mount St. Helens, leasing and regulatory procedure, coal, royalty management, water data telemetry, acid rain, hazardous wastes, oil and gas resources, and digital cartography are reviewed. Chemical and nuclear wastes and petroleum exploration in Alaska are discussed. Management issues are addressed. Mapping activities are reported. Water resources, conservation, and earth sciences, are also reviewed.

5801 Geology And Hydrology

REFER ALSO TO CITATION(S) 19599, 19819, 19842, 19854, 19858, 19862, 19864, 19865, 19866, 22234

22027 (ANL/NESC—930) LINSED; one-dimensional multireach sediment transport model. Fields, D.E. (Oak Ridge National Lab., TN (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048930.

LINSED consists of a driver program coupled with the SEDTRN model of sediment transport for a rectangular stream channel to allow simulation of sediment transport in a one-dimensional multi-reach channel system. The LINSED model can accept specification of a branching channel system of up to nine nominally homogeneous segments (reaches). Sediment input to each reach from external sources along the reach is permitted.IBM360,303x; FORTRAN IV; OS/360 (IBM360), OS/303x (IBM303x); 50,000 bytes of memory are required.

22028 (DOE/AL/10752—17) Hydrologic analyses of two brine encounters in the vicinity of the Waste Isolation Pilot Plant (WIPP) Site. Spiegler, P. (New Mexico Health and Environment Dept., Santa Fe (USA). Environmental Improvement Div.). Dec 1982. Contract AC04-78AL10752. 72p. NTIS, PC A04/MF A01. Order Number DE83007493.

The data from ERDA-6 indicates a naturally fractured reservoir of the two-porosity type. The best estimate of the volume is about 60 thousand to 120 thousand barrels. The data from WIPP-12 also indicates a naturally fractured reservoir of the two-porosity type. The best estimate of the volume is about 5 million to 10 million barrels. The excess pressure above hydrostatic pressure suggests that the reservoirs were formed many millions of years ago. The location of the fractures suggest that their formation may be connected to the tilting of the Delaware Basin as a unit. The effect of the flow testing data on a drilling scenario through the repository many years following its closure is evaluated.

22029 (DOE/ET/12138—1335) Field techniques for measuring joint intensity. Dixon, J.M. (West Virginia Univ., Morgantown (USA). Dept. of Geology and Geography). Sep 1979. Contract AC21-76ET12138. 15p. NTIS, PC A02/MF A01. Order Number DE83006561.

Hydrocarbon production from fractured reservoirs, increased water-well yields, coal mine roof falls, and some construction problems often have been cited as having been caused by an increase in fracture intensity. A relatively fast and easy method to measure fracture intensity and locating areas of intense fracturing would be generally useful, and in particular, in potential drilling areas where little or no subsurface data is available. As part of the Eastern Gas Shales Project, funded by the US Department of Energy, such a method was developed. This paper reports the summary of methods used, a test of operator variability, and a handbook of suggested procedures. 1 table.

22030 (LA—9616-T) Thermal and kinematic history of mantle xenoliths from Kilbourne Hole, New Mexico. Bussod, G.Y.A. (Los Alamos National Lab., NM (USA)). Feb 1983. Contract W-7405-ENG-36. 81p. NTIS, PC A05/MF A011. Order Number DE83008359.

A suite of spinel lherzolite xenoliths representing two distinct textural types provides evidence for vertical inhomogeneity within the upper mantle beneath Kilbourne Hole, New Mexico. Fine grained, tabular equigranular samples show a wider range of Mg/Fe ratios of their constituent phases than coarse, protogranular samples. These differences are correlated with generally higher bulk Fe and LREE contents in the former. The two lherzolite varieties also differ in the preferred orientations of olivine. The symmetry of olivine fabrics is orthorhombic for both types and is interpreted as resulting from preferential slip on [100] (010), the dominant slip system at high temperatures. However, the olivine fabrics in the protogranular samples are more nearly axial about [010], perhaps the result of a variation in mantle rheology with depth. Olivine fabrics from composite samples are more complex, though their symmetry is also dominantly orthorhombic. Weak girdles about a [010] maximum are typically present and may be due to the formation of pyroxenite or amphibole-bearing veins visible in these samples. Olivine-spinel (Fabries) and two-pyroxene (Wells) thermometers are in agreement indicating equilibration temperatures of 950° to 1050°C for the protogranular xenoliths. Discrepant results between the two thermometers for the tabular equigranular xenoliths are attributed to disequilibrium between the spinel and silicate phases, and not to inherent differences between the thermometers. These samples show evidence for a complex thermal history possibly related to the intrusion of basaltic magma prior to and during xenolith entrainment. Two independent barometric estimates tentatively place the tabular equigranular samples at shallower depths than the protogranular samples.

22031 (LBL—13600) Earth Sciences Division annual report 1981. (Lawrence Berkeley Lab., CA (USA)). Sep 1982. Contract AC03-76SF00098. 192p. NTIS, PC A09/MF A01. Order Number DE83004044.

Separate abstracts were prepared for the 59 papers of the 1981 annual report of the Earth Sciences Division at Lawrence Berkeley Laboratory. The general topics covered included nuclear waste isolation, geophysics and reservoir engineering, and geosciences. (KRM)

22032 (LBL—13600, pp 24-27) **Porous media equivalent for a network of discontinuous fractures.** Long, J.C.S. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1981.

One of the important questions that arises when considering the flow of fluids through a discontinuous rock mass is whether the fracture network behaves as a porous medium. The work that has been done to determine the equivalent permeability of fractured rocks from information on fracture geometry (assuming an impermeable matrix) can be classified into the categories. Most of the work falls into the category in which fractures are assumed to be continuous, or of infinite extent (extensive fractures). Very little work has been done in the category in which fractures are assumed to be discontinuous, or of finite extent. It can be seen in the field that fractures are clearly of finite dimensions. The fact that fractures are finite means that each fracture can contribute to the permeability of the rock only insofar as it intersects other conducting fractures. In the extreme, an isolated fracture which does not intersect any other fracture effectively contributes nothing to the permeability of the total rock mass. This means that flow in any given fracture is not independent of flow in every other fracture.

22033 (LBL—13600, pp 28-31) **Determining size and interconnection of fractures from constant-head well tests.** Doe, T.; Endo, H. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1981.

The ability of low-permeability rock to transmit water is determined by the interconnection of the fractures in the rock. The degree of interconnection is related to the basic geometric parameters of the fracture system - orientation, aperture, density (number of fractures per unit volume), and fracture area. The purpose of this program was to see if information on the areas, apertures, and interconnections of fractures could be obtained from well tests. Although the thrust of the work was toward single fracture tests, the results are applicable to test zones containing several fractures, as one should expect that the largest fracture in any given test zone will dominate the test behavior. A further objective was to see if conventional radial-flow well-test solutions could be applied to rock in which the flow conduits are finite fractures.

22034 (ONWI—356) **Permeability of selected sediments in the vicinity of five salt domes in the Gulf Interior Region.** Slaughter, G.M.; White, R.M.; Alger, R.P. (Law Engineering Testing Co., Marietta, GA (USA)). Feb 1983. Contract AC06-76RL01830. 76p. NTIS, PC A05/MF A01. Order Number DE83008126.

The purpose of this investigation was to determine what relationships might exist between permeability and parameters available from geophysical logs of sediments within the Gulf Interior Region. The parameters that have received the most attention in the literature are formation resistivity factor and porosity. Empirical relationships between permeability and porosity, gamma-ray bulk density, the fraction of intergranular pore space occupied by clay or silt, and porosity differences were investigated. Porosity appears to be the log parameter that best correlates with permeability.

22035 (RHO-BWI-LD—9) **Geology of the Wallula Gap Area, Washington.** Gardner, J.N.; Snow, M.G.; Fecht, K.R. (Rockwell International .Corp., Richland, WA (USA). Rockwell Hanford Operations). Dec 1981. Contract AC06-77RL01030. 101p. NTIS, PC A06/MF A01. Order Number DE83007027.

This study focuses on the structure and stratigraphy of an 80-km^2 area at the southern margin of the Pasco Basin in Wallula Gap. Field stratigraphy, petrography, natural remanent magnetism, and major-element chemistry indicate that the tholeiitic basalt flows of the Wallula Gap area correlate with units of the Grande Ronde, Wanapum, and Saddle Mountains Formations of the Yakima Subgroup of the Columbia River Basalt Group. Flows of the Frenchman Springs, Umatilla, Pomona, Elephant Mountain, and Ice Harbor Mmebers are present in the area. The Frenchman Springs Member exposed in the Wallula Gap is more than 185 m thick and consists of eight to nine flows. Its thickness and possible contemporaneous structural deformation apparently prevented emplacement of both the Roza and Priest Rapids Members at this locality. Structural uplift of the Horse Heaven Hills began prior to extrusion of the Pomona flow. Both the Pomona and Elephant Mountain Members thin and pinch out over the crest of the uplift near Mound Pond. The Ice Harbor flow was apparently confined to the basin north of the Horse Heaven uplift, but an exposure at Mound Pond suggests it flowed through Wallula Gap as an intracanyon flow. The Wallula Gap fault zone trends N65°W and can be traced for at least 11 km along the north flank of the Horse Heaven Hills uplift. Where the fault intersects the Olympic-Wallowa Lineament at Van Sycle Canyon 8 km east of Wallula Gap, it is a broad zone of normal faulting, 300 m wide, with as much as 310 m of displacement of the basalt stratigraphy. Two faults occur in the northern portion of Van Sycle Canyon and define a graben trending N45°W. A third fault, roughly parallel to the Wallula Gap fault, transects the The Nub and offsets 14 m of Ice Harbor basalt.

5802 Geophysics

REFER ALSO TO CITATION(S) 21683, 22030

22036 **(AD-A—115024/2) Users' manual for SNAP/D: seismic network assessment program for detection. Final report.** Ciervo, A.P.; Sanemitsu, S.K.; Snead, D.E.; Suey, R.W. (Pacific Sierra Research Corp., Santa Monica, CA (USA)). Sep 1980. 179p. (PSR—1027). NTIS, PC A09/MF A01.

This report is a user's manual for SNAP/D (Seismic Network Assessment Program for Detection), a computer model designed for assessing the ability of a network to detect and locate seismic events (i.e., earthquakes or explosions). Part I presents the analytical structure of the model, whereas Part II documents the computer code.

22037 **(CNEN-RT/AMB—(81)11) Seismic data summary for the colli albani area.** Molin, D. (Comitato Nazionale per l'Energia Nucleare, Casaccia (Italy). Dipartimento Radiazioni e Ricerche di Sicurezza e Protezione). 1981. 119p. (In Italian). Dep. NTIS (US Sales Only), MF/A01. Order Number DE82903052.

Following the shocks recorded in April and May, 1981, in the Colli Albani area, data regarding historical seismicity have been requested by local civil services. Macroseismic catalogue and isoseismic map Atlas regarding the above mentioned area are supplied. Considerations on distribution of shocks in time domain, on main earthquakes and maximum historical intensity are then discussed.

22038 **(E—82-10011) Geologic applications of thermal-inertia mapping from satellite. Final report.** Offield, T.W.; Watson, K.; Hummer-Miller, S. (Geological Survey, Denver, CO (USA)). Jul 1981. 109p. NTIS, PC A06/MF A01.

In the Powder River Basin, Wyo., narrow geologic units having thermal inertias which contrast with their surroundings can be discriminated in optimal images. A few subtle thermal inertia anomalies coincide with areas of helium leakage believed to be associated with deep oil and gas concentrations. The most important results involved delineation of tectonic framework elements some of which were not previously recognized. Thermal and thermal inertia images also permit mapping of geomorphic textural domains. A thermal lineament appears to reveal a basement discontinuity which involves the Homestake Mine in the Black Hill, a zone of Tertiary igneous activity and facies control in oil producing horizons. Applications of these data to the Cabeza Prieta, Ariz., area illustrate their potential for igneous rock type discrimination. Extension to Yellowstone National Park resulted in the detection of additional structural information but surface hydrothermal features could not be distinguished with any confidence. A thermal inertia mapping algorithm, a fast and accurate image registration technique, and an efficient topographic slope and elevation correction method were developed.

22039 **(E—82-10153) Application of hcmm data to regional geologic analysis for mineral and energy resource evaluation.** Watson, K.; Miller, S.H. (Geological Survey, Denver, CO (USA)). Nov 1981. 4p. (NASA-CR—168538). NTIS, PC A02/MF A01.

Sponsored by NASA HCMM.

A more accurate algorithm was developed to compute thermal inertia from temperature difference and albedo information. The error of this algorithm is about 1/3 of the measurement error in HCMM as opposed to the current algorithm which can have an error 5 times larger. A northeast trending lineament was discovered in southewestern Arizona on enhanced thermal inertia images.

22040 (E—82-10243) **Application of HCMM data to regional geologic analysis for mineral and energy resource evaluation.** Watson, K.; Miller, S.H. (Geological Survey, Denver, CO (USA)). May 1981. 4p. (NASA-CR—168824). NTIS, PC A02/MF A01.

Sponsored by NASA HCMM.

The effects of topographic elevation and slope on thermal images were examined using representative field obstructions of the solar and sky radiation and a simple linearized thermal model. The forms are easily adapted for analysis of HCMM images using the DMA digital terrain data. From a representative set of field observations, it was found that flux variations with elevation can cause changes in the mean diurnal temperature gradient from -4 deg to -14 deg per km evaluated at 2000 m. Changes in the temperature difference gradient of 1 to 2 C per km are also produced which is equivalent to an effective thermal inertia gradient of 100 W s to the 1/2 power/sq m K/1 per km. Exposed bedrock on topographic ridges will appear to have a lower thermal inertia due to the additional effect.

22041 (E—82-10244) **Investigation from Japanese MAGSAT team. Part a. crustal structure near Japan and in antarctic station. Part b. electric currents and hydromagnetic waves in the ionosphere and the magnetosphere.** Fukushima, N. (Tokyo Univ. (Japan)). Dec 1981. 13p. (NASA-CR—168825). NTIS, PC A02/MF A01.

Preliminary results of MAGSAT data analysis are described. Regional anomaly maps (deviations from the MGST model field) for X,Y,Z, and F in the area of 115 to 155 deg E and 20 to 60 deg N were obtained. A similar map for the geomagnetic total force anomaly in the vicinity of Japan showed that the observed anomaly can be explained by the difference in crustal magnetization between the Japan Sea and the Japan Island, which reflects a difference of 25 km in the thickness of the magnetized layer. The MAGSAT record of a sudden commencement of a magnetic storm above the South Atlantic Ocean showed a reverse impulse particularly in the D-component. Results relating to toroidal currents in the ionosphere, transverse and parallel perturbations over the polar regions, the relationship between field aligned currents and precipitating electrons, and the calculation of the subsatellite electric field are also discussed.

22042 (E—82-10249) **Geological and geothermal investigations for HCMM-derived data. Final report, June 1977 - June 1981.** Lyon, R.J.P.; Prelat, A.E.; Kirk, R. (Stanford Univ., CA (USA)). Jun 1981. 146p. (NASA-CR—168830). NTIS, PC A07/MF A01.

An attempt was made to match HCMM- and U2HCMR-derived temperature data over two test sites of very local size to similar data collected in the field at nearly the same times. Results indicate that HCMM investigations using resolutions cells of 500 m or so are best conducted with areally-extensive sites, rather than point observations. The excellent quality day-VIS imagery is particularly useful for lineament studies, as is the DELTA-T imagery. Attempts to register the ground observed temperatures (even for 0.5 sq mile targets) were unsuccessful due to excessive pixel-to-pixel noise on the HCMM data. Several computer models were explored and related to thermal parameter value changes with observed data. Unless quite complex models, with many parameters which can be observed (perhaps not even measured) only under remote sensing conditions (e.g., roughness, wind shear, etc) are used, the model outputs do not match the observed data. Empirical relationship may be most readily studied.

22043 (E—82-10306) **Investigation of the effects of external current systems on the MAGSAT data utilizing grid cell modeling techniques.** Klumpar, D.M. (Texas Univ., Richardson (USA)). Apr 1982. 11p. (NASA-CR—168881). NTIS, PC A02/MF A01.

ERTS.

Progress made in reducing MAGSAT data and displaying magnetic field perturbations caused primarily by external currents is reported. A periodic and repeatable perturbation pattern is described that arises from external current effects but appears as unique signatures associated with upper middle latitudes on the Earth's surface. Initial testing of the modeling procedure that was developed to compute the magnetic fields at satellite orbit due to current distributions in the ionosphere and magnetosphere is also discussed. The modeling technique utilizes a linear current element representation of the large scale space current system.

22044 (E—82-10308) **Investigation of Antarctic crust and upper mantle using MAGSAT and other geophysical data.** Bentley, C.R. (Wisconsin Univ., Madison (USA)). Jan 1982. 1p. (NASA-CR—168883). NTIS, PC A02/MF A01.

ERTS.

Development of a spectral analysis technique to determine the depth to the Curie Isotherm from MAGSAT data over Antarctica is reported. The analysis of the power spectra of a number of MAGSAT passes over Antarctica indicates on the average two power maxima for each flight pass, one with spatial wavelength of approximately 2000 km and the other with a wavelength of approximately 700 km. It was not determined whether these spectral peaks are geological or mathematical in origin.

22045 (E—82-10319) **The crustal structure and tectonics of South America.** Keller, G.R.; Lidiak, E.G. (Texas Univ., El Paso (USA)). Sep 1981. 4p. (NASA-CR—168898). NTIS, PC A02/MF A01.

A preliminary crustal structure map and a bibliography of crustal and upper mantle studies for South America are given. Work on the surface wave analysis and tectonic characterizations continues.

22046 (E—82-10320) **Geotectonics of South America.** Keller, G.R.; Lidiak, E.G. (Texas Univ., El Paso (USA)). Mar 1982. 36p. (NASA-CR—168899). HC A03/MF A01.

Preliminary satellite scalar magnetic anomaly data (MAGSAT) reduced to vertical polarization and long wavelength-pass filtered free air gravity anomaly data of South and Central America are compared to major tectonic features. In addition, a geotectonic overview of South America is presented.

22047 (LBL—13600, pp 72-75) **Geophysical borehole measurements in low-permeability rock.** Nelson, P.H.; Rachiele, R. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

Geophysical methods respond to the presence of discontinuities in rock, to the mineralogical properties, and to properties of fluids saturating the pore space. In the following examples, permeability variations inferred from geophysical logs by simple inspection and correlation are compared with hydrologic permeability determiations. In addition, a new method of permeability profiling is illustrated by flow logs obtained with dissolved radon, a naturally occurring radioactive tracer. All the records shown are from the field project at Stripa, Sweden. Boreholes SBH-1 and SBH-3, inclined at 45 degrees, penetrated a metamorphic (leptite) sequence and a granitic (quartz monzonite) pluton. The 3-in.-diameter boreholes were logged with geophysical probes before permeability determinations were made with injection methods on intervals isolated with packers.

22048 (LBL—13600, pp 85-86) **Electromagnetic modeling using a fast numerical Sommerfeld integral.** Lee, K.H.; Morrison, H.F. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

The successful application of electromagnetic techniques in the search for anomalously conductive structures in the earth requires a means for rapid calculation of the response of three-dimensional bodies to dipole and plane wave fields. In the integral equation modeling technique, as in other useful techniques, a great number of Green's functions of the Sommerfeld integral type must be numerically computed. Such integrals are evaluated primarily by means of a Gaussian quadrature integration technique, the convergence of which can be accelerated using Euler's transformation. A recently developed numerical convolution or digital filter technique has become popular for calculating various Green's functions. The method avoids the evaluation of the Bessel function and appears to be about an order of magnitude faster than the Gaussian quadrature technique.

22049 (LBL—13600, pp 95-98) **Application of ASP: an Automated Seismic Processor.** Majer, E.L.; McEvilly, T.V. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

For the past several years, the Seismographic Station of the University of California, Berkeley, and Lawrence Berkeley Laboratory have been developing an in-field, low-power, real-time processor for microearthquake data. The objective is to utilize CMOS microprocessor technology (RCA 1802) to automate the routine, labor-intensive processing of microearthquake survey data. The Automated Seismic Processor (ASP) is presently set up to handle 15 channels of data, although the system is configured for up to 128 channels. A WORKER computer on each channel automatically detects P- and S-waves, measures their arrival times and amplitudes, and computes and fits FFT's for both waves on data sampled at 100 samples/s. These data from each channel are then processed with a central microprocessor (the BOSS) for hypocenter location, running b-values, source parameters, event count, and P-wave polarities. The system is capable of processing a 15-station detection in approximately 40 s, excluding printout. The initial trials have demonstrated that in-field, real-time analysis of data maximizes the efficiency of microearthquake surveys, allowing flexibility in experimental procedures with a minimum of the traditional labor-intensive postprocessing. Current efforts are directed toward improving efficiency of computation and data output and toward expanding software capabilities.

22050 (NP—3901011) **Determination of lateral inhomogeneities in seismics by means of inversion of transit time anomalies.** Neumann, G. (Technische Univ. Berlin (Germany, F.R.). Fachbereich Bergbau und Geowissenschaften). 24 Apr 1981. 123p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83901011.

A method for the inversion of transit time residues has been studied with respect to a possible application in the field of applied seismology to localise lateral inhomogeneties. At first the resulting systems of linear, inhomogeneous equations are solved by a damped version of the method of generalized matrix inversion where a separation of the data matrix in eigenvalues and eigenvectors is necessary. A two-dimensional ansatz has been selected, as the measurements in explorational seismology are very often performed along profiles. This ansatz has been tested in the evaluation of model experiments to determine transit-time anomalies in transmission, reflection and refraction. Results are presented of seismic velocity distributions for models with circular and squared inhomogenities, for a trough model and well as for an edge model. The influence of the necessary damping measures on the solution and the propagation of measuring errors and linearisation errors is discussed. Velocity contrasts of 20% are found to be admissible, although large linearisation errors are obtained for velocity contrasts above 5%.

22051 (NUREG/CR—3079) **Earthquake hazard studies in New York State and adjacent areas. Final report, April 1976-June 1982.** Kufka, A.L. (Columbia Univ., Palisades, NY (USA). Lamont-Doherty Geological Observatory). Jan 1983. 76p. NTIS, PC A05/MF A01 - GPO $5.00. Order Number DE83901345.

Lamont-Doherty Geological Observatory (LDGO) currently operates a network of 38 short period seismic stations in the states of New York, New jersey and Vermont. It is part of the larger Northeastern United States Seismic Network (NEUSSN) operated by several university groups in New York, New Jersey, Pennsylvania and New England. These networks provide a wealth of data to study seismicity, earthquake hazards, earthquake source properties, tectonic processes, and crustal and upper mantle structure in the northeastern United States and adjacent parts of Canada. The LDGO network provides data for more specific studies of earthquake processes in New York State and adjacent areas. This report discusses results of research related to the operation of the network and also introduces current directions of research for future studies.

22052 (NUREG/CR—3109) **Seismicity and tectonic relationships of the Nemaha Uplift in Oklahoma. Part V. Final report.** Luza, K.V.; Lawson, J.E. Jr. (Oklahoma Univ., Norman (USA)). Feb 1983. 127p. NTIS, PC A07/MF A01 - GPO $5.50. Order Number DE83901537.

The Nemaha Ridge is composed of a number of crustal blocks typically 3 to 5 miles (5 to 8 km) wide and 5 to 20 miles (8 to 32 km) long. Structure-contour maps prepared of the top of the Viola Formation (Ordovician), the base of the Pennsylvanian, and the top of the Oswego Formation (Middle Pennsylvanian) reveal a complex fault pattern associated with the Nemaha Uplift. This fault pattern is dominated by several discontinuous uplifts, such as the Oklahoma City, Lovell, Garber, and Crescent Uplifts. A detailed study of the Oklahoma City Uplift suggests that a number of the Nemaha-related faults were developed in pre-Mississippian time. Many of these faults exhibit both increasing and decreasing displacements from early to late Paleozoic time. However, the displacement for most of the Oklahoma City faults took place between the end of Oswego time and the end of Hunton time. A lineament map was prepared for north-central Oklahoma. A detailed gravity map was prepared for the Kingfisher and Medford maxima. A total-intensity aeromagnetic map for the Enid and Oklahoma City 1° by 2° Quadrangles was prepared. A regional seismograph network was established to supplement existing seismological capability. A local earthquake-location program, named HYPERCUBE, was developed. From 1897 through 1976, Oklahoma has had approximately 128 known earthquakes. After the network became operational in late 1977, 255 additional earthquakes were detected in Oklahoma (through 1981). A study of earthquake distribution and intensity values in Oklahoma led to the development of a seismic-source map for Oklahoma and parts of the adjacent states. Six seismic-source zones were identified. For each zone except one, a magnitude-frequency relationship was determined.

22053 (PB—81-249724) **Probabilistic analysis for liquefaction.** Yegian, M.K.; Vitelli, B.M. (Northeastern Univ., Boston, MA (USA)). Mar 1981. 109p. NTIS, PC A06/MF A01.

A comprehensive review of liquefaction case histories was made and an expanded data set was prepared. The newly compiled field data are presented together with a criterion for liquefaction based on the field observations of liquefaction and nonliquefaction. A simple model for calculating the probability of liquefaction conditional to the occurrence of a particular seismic event is given. Applications of the proposed criterion and the probability model are discussed and comparisons are made between the results of this research and those previously published. Specific applications of the proposed method include an evaluation of overall liquefaction risk at a site and estimation of earthquake-generated excess pore pressures. It is concluded that liquefaction analysis procedures, which are invariably based on field observations, include significant uncertainties because of the imperfect nature of the data used. Use of the probability model presented herein permits proper evaluations of these uncertainties.

22054 (PNL—4562) **User's manual for geophysical well-logging software programs.** Petrie, G.M.; Gibson, D.; Blair, S.C. (Pacific Northwest Lab., Richland, WA (USA)). Feb 1983. Contract AC06-76RL01830. 93p. NTIS, PC A05/MF A01. Order Number DE83008203.

Since 1958 the Ground-Water Surveillance Program for the Hanford Site has made geophysical logging measurements in most of the 800 wells and deep boreholes that have been drilled on the Hanford Site. In 1980 the Pacific Northwest Laboratory (PNL), which conducts the Ground-Water Surveillance Program, began forming a computerized data base for storing and retrieving geophysical well log data and developing software for quantitative analysis of the well log data. This report, designed to serve as a user's guide, documents the data base system that handles the well log data. Two programs, DIGLOG1 and LOGIT, are used to manipulate the data. The program DIGLOG1 translates analog paper strip charts into digital format; the program LOGIT is a general utility program that edits, displays, checks, stores, writes, and deletes sets of well log data. These two programs do not provide sophisticated display and analytical capabilities; rather, they provide programs that give the user easy access to powerful standard analytical software.

22055 **Constitutive laws, tensorial invariance and chocolate cake.** Rundle, J.B.; Passman, S.L. (Sandia National Labs., Albuquerque, NM). *Geophysical Surveys;* **5**: 3-36(1982). Contract AC04-76DP00789.

Although constitutive modeling is a well-established branch of mathematics which has found wide industrial application, geophysicists often do not take full advantage of its known results. We present a synopsis of the theory of constitutive modeling, couched in terms of the simple material, which has been extensively studied and is complex enough to include most of the correct models proposed to describe the behavior of geological materials. Critical in the development of the theory are various invariance requirements, the principal ones being coordinate invariance, peer group invariance (isotropy), and frame-indifference. Each places distinct restrictions on constitutive equations. A noncomprehensive list of properly invariant and commonly used constitutive equations is given. To exemplify use of the equations, we consider two problems in detail: steady extension, which models the commonly performed constant strain rate triaxial test, and simple shearing. We note that each test is so restricted kinematically that only the most trivial aspects of material behavior are manifested in these tests, no matter how complex the material. Furthermore, the results of one test do not generally determine the results of the other.

22056 **Relationship between microseismicity and high pore pressures during hydraulic stimulation experiments in low permeability granitic rocks.** Pearson, C. (Los Alamos National Lab., NM). *Journal of Geophysical Research;* **86**: No. B9, 7855-7864(10 Sep 1981).

Several hundred microearthquakes with local magnitudes ranging between -4 and -2 were recorded during hydraulic stimulation experiments at the hot dry rock demonstration site, Fenton Hill, New Mexico. These events are probably caused by shear failure induced by high pore fluid pressures. Since the event locations seem to cluster in a narrow band near the hydraulic fracture, we were able to use microseismic techniques to locate the hydraulic fracture and monitor its growth. We calculate the minimum pore pressure increase necessary to induce rock failure using a simple model of slippage on preexisting fractures. By comparing a pore pressure distribution, calculated using a one-dimensional diffusion model with the distribution of event foci, we demonstrate that high pore pressures are a probable cause for these microearthquakes. Stress drops for these microearthquakes, calculated from spectral parameters, increased by a factor of 3 during the course of the experiment. The stress drop increase correlates with a migration of seismic activity away from the injection well bore, which suggests relatively low in situ shear stresses near the well bore caused by strain release in this region during previous pressurizations.

5803 Mineralogy, Petrology, And Rock Mechanics

REFER ALSO TO CITATION(S) 19767, 19849, 19851, 19858, 21197, 22030, 22056

22057 **(DOE/ER/10361--T1) Mechanical and transport properties of rocks at high temperatures and pressures. Task III. Technical progress report Number 3, 1 March 1982-30 October 1982.** Friedman, M.; Handin, J.; Bauer, S.J. (Texas A and M Univ., College Station (USA). Center for Tectonophysics). Nov 1982. Contract AS05-79ER10361. 112p. NTIS, PC A06/MF A01. Order Number DE83007278.

In an effort to characterize the rheology and flow processes (mechanisms of deformation) operative for presupposed semi-brittle behavioral conditions we have conducted a series of drained constant stress creep tests on 2 x 4 cm specimens of dry and water-saturated (Pp = 100 MPa) Westerly Granite at 100 MPa effective confining pressure and temperatures of 300°C to in excess of Tm (1000°C). The deformation is multimechanistic; microfracturing of apparent extensile and shear origin, glide in quartz and biotite, microfracture healing, dissolution, and mineral alteration are mechanisms observed and evaluated as functions of temperature and strain. We attempt to partition the bulk specimen deformation into that contributed by the individual mineral species in the analysis. Available equations of flow and time to failure are used as response models to characterize the experimental data even though the multimechanistic deformation described above and the quasi-steady state are not compatible with the assumptions underlying the corresponding theories. Data for 600°C and below (the brittle field) are well fit by an equation of the form: t/sub failure/ = t_0 p/sub - α/ exp (E/RT -Kσ), which has been shown to predict the static fatigue time for rock. Using this expression, we calculate apparent activation energies for the total fatigue processes in the α-quartz field of 7.5 kcal/mole (300 to 400°C, dry) and 21.6 kcal/mole (400 to 600°C, wet, Pp of 100 MPa. Quasi-steady state flow is observed in the β-quartz field (700 to 800°C) and the flow behavior is described by e = A exp (-Q/RT)σ/sup n/, where Q = 68 kcal/mole, n = 2.7, and A = 25.2.

22058 **(LA--9481-MS) Sentinel Gap basalt reacted in a temperature gradient.** Charles, R.W.; Bayhurst, G.K. (Los Alamos National Lab., NM (USA)). Jan 1983. Contract W-7405-ENG-36. 31p. NTIS, PC A03/MF A01. Order Number DE83008281.

Six basalt prisms were reacted in a controlled temperature gradient hydrothermal circulation system for two months. The prisms were centered at 72, 119, 161, 209, 270, and 310°C. Total pressure was 1/3 kbar. All prisms showed large weight loss: 5.5% to 14.9%. The matrix micropegmatite and natural nontronitic alteration reacted readily to clays at all temperatures. The first four prisms were coated with a calcium smectite, and the last two prisms were covered with discrete patches of potassium-rich phengite and alkali feldspar. The results indicated that clays may act as adsorbers of various ions.

22059 (LBL--13600, pp 22-23) **Theoretical model of fluid flow through a deformable rock fracture.** Tsang, Y.W.; Witherspoon, P.A. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1981.

A simple theoretical model has been developed to understand the effect of normal stress on flow through a single rough-walled fracture. In order to gain a fundamental understanding of the problem, we have made several simplifying physical assumptions and have excluded the use of arbitrary fitting parameters.

22060 (LBL--13600, pp 75-78) **Development, verification, and application of modeling techniques for thermomechanical analysis.** Chan, T.; Wilson, E.L. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

The Stripa heater tests have provided a comprehensive data base for the thermomechanical response of a granitic rock mass. Preliminary linear thermoelastic calculations using constant rock properties measured from one or two small specimens did not accord well with field data. Following the completion of data based preparation, a project was established to develop improved analytical and numerical models to simulate thermally induced rock deformations and stresses. This paper summarizes the status of model development, verification, and application as of September 30, 1981.

22061 (LBL--13600, pp 79-82) **Measurement of low rates of water inflow by monitored evaporation in the large-scale permeability experiment at Stripa.** McPherson, M.J. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1980.

The low rates of water inflow to the heading used for the large-scale permeability experiment at Stripa were quantified by monitoring the water-vapor content of the ventilation air. Coupled with measurements of water pressure in sealed sections of boreholes, the data could be utilized to evaluate the macropermeability of the fractured granite around the heading. Transient effects on the apparent water inflow were noted after changes were made in the room temperature or airflow. These were shown to be caused by mixing processes within the room and self-correcting variations in the rate of evaporation from the rock walls. This report analyzes the results of moisture pickup and examines the time transients that occurred during the course of the experiment.

22062 (LBL—13600, pp 177-180) **Measurement of in situ stress using NQR/NMR.** Schempp, E.; Murdoch, J.B.; Klainer, S.M. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1981.

The measurement of stress in rocks underground is a difficult but very important problem in mining engineering and in the design of underground waste repositories. The structural stability of any excavation is critically dependent on the stress distribution in the surrounding rock and its capability to bear the stress, which can build up to hundreds of atmospheres in deep mines. Because existing methods for the determination of stress have limitations, Lawrence Berkeley Laboratory (LBL) has been investigating the use of spectroscopic techniques - nuclear quadrupole resonance (NQR) and nuclear magnetic resonance (NMR) - for rapid in situ measurements of three-dimensional stress in both salt and hard rock. Efforts in the past year have been directed toward computer simulation of borehole stress patterns and NQR lineshapes, laboratory measurements on salt and aluminosilicates, and construction of a state-of-the-art pulsed NQR spectrometer.

22063 (ONWI—355) **Salt, caprock, and sheath study.** Karably, L.S. Jr.; Jernigan, B.L.; Petre, I.C.; Sullivan, J.M. (Law Engineering Testing Co., Marietta, GA (USA)). Jan 1983. Contract AC06-76RL01830. 112p. NTIS, PC A06/MF A01. Order Number DE83008119.

Salt domes of the Gulf Coast region of the United States consist of four component parts: 1) a salt stock, 2) caprock material, 3) sheath material, and 4) the surrounding upturned sediments. Salt stock consists of remarkably pure halite (NaCl), which represents 90 to 99% of the total mass, with the major impurity being anhydrite. Salt stocks are markedly homogeneous and continuous with respect to composition, texture and structure. Caprock consists primarily of anhydrite, gypsum and calcite which commonly occur in monomineralic zones oriented roughly parallel to the top of the salt stock. Caprock composition varies markedly over any single salt stock as well as from one salt stock to another. Fracturing, porosity and permeability of caprock material are correspondingly variable, but are usually developed tto a higher degree in the upper portions of caprock; porosity and permeability may also be relatively high at the caprock-salt interface. Caprock is generally believed to form by residual accumulation of anhydrite from the dissolution of salt, with subsequent alteration of the anhydrite to calcite and gypsum. Sheath material, probably a mixture of sedimentary rocks (clastic and evaporite), formed as a result of mechanical interaction between the salt stock and surrounding sediments during diapirism. Sheath material is thought to be distributed throughout an external zone, consisting mainly of disturbed sediment, and an internal zone, consisting mainly of disturbed salt. Sheath material forms along a roughly cylindrical shear zone which encloses thesalt stock. Sheath material may be overpressured and is generally thought to be impermeable. Upturned sediments around the salt diapirs are the result of dome genesis; hovever, these sedimentary beds and other structures are beyond the scope of this report.

22064 **Some mechanisms of microcrack growth and interaction in compressive rock failure.** Dey, T.N. (Univ. of California, Berkeley); Wang, C.Y. *International Journal of Rock Mechanics and Mining Sciences and Geomechanics Abstracts;* **18**: 199-209(1981).

Under uniaxial or triaxial load, stress inhomogeneities are generated in crystalline rock at point contacts and at boundaries between grains of dissimilar elastic constants. These stress inhomogeneities may be responsible for the extension of dilatant cracks. Theoretical models are developed to study these possibilities. The models predict axial splitting in rocks under uniaxial compression. Application of moderate confining pressures severely limits crack extension and thus inhibits axial splitting. Interaction between cracks, together with these stress inhomogeneities, tends to form a zone of intense deformation inclined 30 to 40° to the maximum principal stress where larger angles are associated with higher confining pressures. The axially-oriented cracks in such a zone tend to grow towards each other and thus may coalesce to form the diagonal macroscopic fracture found in brittle rocks under triaxial conditions.

5804 Geochemistry

REFER ALSO TO CITATION(S) 19845, 19854, 19858, 19862

22065 (CONF-810378—3) **Aspects of the history of 66095 based on trace elements in clasts and whole rock.** Jovanovic, S.; Reed, G.W. Jr. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 26p. NTIS, PC A03/MF A01. Order Number DE83007665.

From 12. lunar and planetary science conference; Houston, TX, USA (16 Mar 1981).

Large fractions of Cl and Br associated with separated anorthositic and basaltic clasts and matrix from rusty rock 66095 are soluble in H_2O. Up to two orders of magnitude variation in concentrations of these elements in the breccia components and varying H_2O-soluble Cl/Br ratios indicate different sources of volatiles. An approximately constant ratio of the H_2O to acid soluble Br, i.e. surface deposits vs possibly phosphate related Br, suggests no appreciable alteration in the original distributions of this element. Weak acid leaching dissolved $\sim$ 50% or more of the phosphorus and of the remaining Cl from most of the breccia components. Clast and matrix residues from the leaching steps contain, in most cases, the Cl/P_2O_5 ratio found in 66095 whole rock and in a number of other Apollo 16 samples. No dependence on degree of brecciation is indicated. The clasts are typical of Apollo 16 rocks. Matrix leaching results and element concentrations suggest that apatite-whitlockite is a component of KREEP.

22066 (INIS-mf—7500, pp v) **Model experiments for the interpretation of the carbon isotope ratio variations of the CO_2 occurrences in Slovakia.** Kecskes, A.; Izsof, K. (Department of Physics, Educational Faculty, Nitra (Czechoslovakia)); Cornides, I. (Mass Spectrometer Laboratory of the Hungarian Mining Research Institute, Budapest). [nd]. .

From 6. Czechoslovak spectroscopic conference; Nitra, Czechoslovakia (1 Sep 1980).

Published in summary form only.

22067 (LBL—13600, pp 171-172) **Geoanalytical and chemical bonding studies using modern surface techniques.** Perry, D.L. Sep 1982. NTIS, PC A09/MF A01.

In Earth Sciences Division annual report 1981.

In the last several years, a number of new instrumental surface techniques have been developed that are quite effective in detecting changes in the surfaces of minerals that have undergone chemically induced reactions or natural geologic alteration. These techniques are quite sensitive, and they make it possible to monitor very small amounts of elements that may be present on the mineral surfaces. Thus, any change in the surface due to chemical composition or bonding may be readily measured qualitatively and, in some cases, quantitatively. Surface measurements as part of a mineral geochemical study have several advantages. Several of the more widely used techniques are discussed below.

64 PHYSICS RESEARCH

6401 Astrophysics And Cosmology

REFER ALSO TO CITATION(S) 21197, 21625, 21682, 22200, 22201, 22202, 22371, 22409, 22409, 22562

22068 (AD-A—099475) **Analysis of a series of solar flare x-ray spectra.** Mckenzie, D.L.; Landecker, P.B. (Aerospace Corp., El Segundo, CA (USA)). May 1981. 42p. NTIS, PC A03/MF A01.

REFS.

Thirteen X-ray line spectra (7.8 to 23.0 A) acquired during a solar flare that peaked at 2326 UT were analyzed. The data include fluxes of lines excited throughout the temperature range present in the coronal flare. The coronal flare emission measure began to decrease 500 s or less after the broad band X-ray flux peaked. The differential emission measure was calculated from the data by using collision strengths for a small number of the observed lines.

22069 (AD-A—115505/0) Experimental comprehensive solar flare indices for 'major' and certain lesser flares 1975-1979. Dodson, H.W.; Hedeman, E.R. (World Data Center A for Solar-Terrestrial Physics, Boulder, CO (USA)). Jul 1981. 41p. (UAG—80). Availability: World Data Center A for Solar-Terrestrial Physics, NOAA, Boulder, CO 80303. HC $2.00 (No copies furnished by DTIC).

In July 1971 a report on 'An Experimental, Comprehensive Flare Index and its Derivation for 'Major' Flares, 1955-1969' was published by the present authors as Report UAG-14 of World Data Center A for Solar-Terrestrial Physics. The index apparently proved to be a useful tool for some investigators, and values of the indices for the later years, 1970-1974, were published in Report UAG-52, 'Experimental Comprehensive Solar Flare Indices for Certain Flares, 1970-1974'. Requests have been received for values of the Comprehensive Flare Index (CFI) for still later years. Accordingly, the present report has been prepared for 1975 through 1979, years that complete data for solar cycle 20 and provide information for the ascending branch of cycle 21. (For November-December 1979, it was necessary to use preliminary summaries of flare data. Final Ha flare evaluations were not available for these months at the time of preparation of this report.)

22070 (AD-A—115527/4) Evolutionary charts of solar activity (calcium plages) as functions of heliographic longitude and time 1964-1979. Hedeman, E.R.; Dodson, H.W.; Roelof, E.C. (World Data Center A for Solar-Terrestrial Physics, Boulder, CO (USA)). Aug 1981. 120p. (UAG—81). Availability: World Data Center A for Solar-Terrestrial Physics, NOAA, Boulder, CO 80303 HC$4.00 (No copies furnished by DTIC/NTIS).

The richness and diversity of data relating to solar activity present a challenge from the point of view of organization and evaluation. For phenomena such as plages and centers of activity that tend to last for more than one solar rotation, we have prepared a sequence of 'evolutionary charts' based on heliographic longitude for successive solar rotations. Such a diagrammatic representation of calcium plages as a function of longitude and time, coupled with considerations of heliographic latitude, permits relatively easy and confident recognition of successively returning centers of activity. In past years, certain studies of solar activity prepared at the former McMathHulbert Observatory of the University of Michigan have used the format of such evolutionary charts to organize the chromospheric aspects of long enduring solar activity for time intervals of several years. These charts have proved useful in recognizing patterns of large scale organization on the sun. It is possible that solar activity organized in this manner for 16 years, somewhat more than an entire solar cycle, can provide guidance for the interpretation of other aspects of solar activity and of phenomena of the interplanetary medium including sector boundaries, geomagnetic activity, energetic particle events and solar wind streams. To this end, evolutionary charts have been prepared on the basis of McMath-Hulbert Observatory data and diagrams. These charts organize data relating to practically all calcium plages reported by the McMath-Hulbert Observatory to World Data Center A for Solar-Terrestrial Physics (Boulder) in the years 1964-1979.

22071 (AD-A—115870/8) Interferometric observations of solar flare precursors at 10.6 ghz. Final report oct 80-jan 82. Hurford, G.J.; Zirin, H. (California Inst. of Tech., Pasadena (USA)). Mar 1982. 44p. NTIS, PC A03/MF A01.

The purpose of this study was to examine a data base of interferometric solar microwave data in order to identify, evaluate and interpret preflare microwave signatures, with reference to their possible role for the short-term prediction of solar flares. The data base used was acquired by the Owens Valley solar interferometer at 10.6 GHz between February 19, 1980 and March 31, 1981. Twenty-seven major flares which occurred between February 19 and August 31, 1980 and for which good quality interferometric data were available, were selected using optical, soft x-ray OR microwave flux criteria. These events were analysed in detail; very similar preflare signatures noted in four (15%) of the cases. Other unusual preflare behavior was noted in four additional cases. The most common signature was a step-like increase in signal amplitude, accompanied by a decrease or reversal in the degree of polarization. Physically, this precursive signature may be identified with the onset phase of solar flares, when slow heating in the metastable magnetic loops destabilize the system, leading to rapid energy release in the impulsive phase. The reason for the distinctive polarization signature is not understood at present, but may be related to the site of the heating within the magnetic loops.

22072 (AD-A—118170/0) Annotated atlas of h-alpha synoptic charts. McIntosh, P.S. (Johns Hopkins Univ., Silver Spring, MD (USA). Applied Physics Lab.). Jul 1982. 337p. NTIS, PC A15/MF A01.

This volume presents a record of large-scale solar magnetic fields and solar activity during 130 solar rotations, from November 1964 through July 1974, in the form of H-alpha synoptic charts and accompanying descriptive notes. A new perspective on large-scale magnetic fields is provided by the inference of lines of polarity reversal from the systems of structures visible in H-alpha patrol filtergrams. These structures map the neutral lines in the radial component of solar magnetic fields (McIntosh, 1972a), thereby revealing details of the boundaries to large-scale magnetic fields that are not recorded in magnetograms sensitive to the longitudinal (line-of-sight) component of the fields. This atlas testifies that neutral lines are of themselves important physical features in solar activity. They are associated directly with systems of physical structures. They form continuous lines that often encircle the entire sun. They have lifetimes in excess of 2 years. The neutral-line patterns normally predate, and survive, the occurrence of important centers of sunspot and flare activity.

22073 (AD-A—120096/3) Computer simulation of kinetic properties of plasmas. Final report. Denavit, J. (Northwestern Univ., Evanston, IL (USA). Dept. of Mechanical and Nuclear Engineering). Aug 1982. 18p. NTIS, PC A02/MF A01.

The research was directed toward the development and testing of new numerical methods for particle and hybrid simulation of plasmas, and their application to physical problems of current significance in space physics and in energetic charged-particles systems. This project will terminate on August 31, 1982 and this Final Report describes (I) the research accomplished since the last renewal on April 1, 1981, and (II) a perspective of the work done since the beginning of the project in February 1972.

22074 (ESA-SP—164) Solar system and its exploration. Burke, W.R. (European Space Agency, 75 - Paris (France)). Nov 1981. 272p. NTIS, PC A12/MF A01.

REFS Proc. of Alpbach Summer School Conf., Austria, 29 Jul. - 7 Aug. 1981 sponsored by ESA, CNES and DFVLR Original contains color illustrations.

The origin and evolution of the solar system were discussed. The interaction of the solar wind with the planetary magnetospheres, the boundary conditions and the planetary environments were considered. Planetary atmospheres and Moons were dealt with. Comets, and the technical aspects of space missions were covered. For individual titles, see N82-26088 through N82-26115.

22075 (ESA-SP—1042) Report on the activities of space science department in 1980-1981. Page, D.E.; Fitton, B.; Pedersen, A.; Taylor, B.G.; Wenzel, K.P.; Guyenne, T.D.; Swallow, E.; Levy, G. (European Space Agency, 75 - Paris (France)). Feb 1982. 82p. NTIS, PC A05/MF A01.

REFS Original contains color illustrations.

Cosmic rays, plasma physics, astronomy and high energy astrophysics were studied. Solar and interplanetary proton propagation and acceleration are considered. An experiment for measuring charge spectra of ultraheavy, cosmic ray nuclei is described. Electric field data from ISEE 1 and GEOS 2 were analyzed. Atomic and ionic IR fine structure lines emitted by gaseous nebulae were also studied. The southern galactic plane in the CO(2-1) transition at 1.3 mm wavelength was surveyed. Data from the COS B spark chamber gamma-ray astronomy telescope were analyzed.

22076 (INPE—2251-PRE/034) **Time delays in solar bursts measured in the mm-cm range of wavelengths.** Kaufmann, P.; Costa, J.E.R.; Strauss, F.M. (Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil)). Oct 1981. 36p. NTIS, PC A03/MF A01.

Submitted for publication. Sponsored in part by FINEP and FAPESP.

Various solar bursts were analysed with high sensitivity (0.03 s.f.u., r.m.s.) and high time resolution (1 ms) at two frequencies in the millimeter wave range (22 GHz and 44 GHz) and with moderate time resolution (100 ms) by a patrol telescope at a frequency in the microwave range (7 GHz). It was found that in most cases burst maximum emission is not coincident in time at those frequencies. Preceding maximum emission can be either at the higher or at the lower frequency. Time delays ranged from about 3 sec to near coincidence, defined within 10 ms. Some complex bursts presented all kinds of delays among different time structures, and sometime nearly uncorrelated time structures. Directional particle accelerations in complex magnetic configurations could be considered to explain the variety of the dynamic effects. Fastest burst rise times observed of 10ms at 44GHz and 40 ms at 22 GHz, might be associated to limiting formation times of emission sources combined to various absorption mechanisms at the source and surrounding plasma.

22077 (LA-UR—83-326) **Energy balance and photochemical processes in the inner coma.** Huebner, W.F.; Keady, J.J. (Max-Planck-Institut fuer Physik und Astrophysik, Garching (Germany, F.R.). Inst. fuer Astrophysik; Los Alamos National Lab., NM (USA)). 1982. Contract W-7405-ENG-36. 20p. (CONF-821171—1). NTIS, PC A02/MF A01. Order Number DE83007544.

From Hungarian Academy of Sciences meeting; Budapest, Hungary (1 Nov 1982).

Energy balance and multifluid flow in the coma are described. Expansion cooling, radiative cooling, photodissociative heating, chemical heating, and relative multifluid flow are the processes determining the energy budget. In the fluid dynamics, fast atomic and molecular hydrogen are considered as separate fluids with larger collision mean free paths than the cold bulk fluid that has a larger mean molecular weight. The transition from fluid flow to free molecular flow is approximated. The model predicts hydrogen and bulk fluid flow velocities in general agreement with observations. The effects of the temperature profile and the fast hydrogen flow on the chemistry in the inner coma are investigated. Results from a model approximating conditions in Halley's comet are presented.

22078 (LA-UR—83-348) **Plasma properties of driver gas following interplanetary shocks observed by ISEE-3.** Zwickl, R.D.; Asbridge, J.R.; Bame, S.J.; Feldman, W.C.; Gosling, J.T.; Smith, E.J. (Los Alamos National Lab., NM (USA); Jet Propulsion Lab., Pasadena, CA (USA)). 1982. Contract W-7405-ENG-36. 14p. (CONF-821159—4). NTIS, PC A02/MF A01. Order Number DE83007547.

From 5. solar wind conference; Woodstock, VT, USA (1 Nov 1982).

Plasma fluid parameters calculated from solar wind and magnetic field data obtained on ISEE 3 were studied to determine the characteristic properties of driver gas following interplanetary shocks. Of 54 shocks observed from August 1978 to February 1980, 9 contained a well defined driver gas that was clearly identifiable by a discontinuous decrease in the average proton temperature across a tangential discontinuity. While helium enhancements were present in all of 9 of these events, only about half of them contained simultaneous changes in the two quantities. Often the He/H ratio changed over a period of minutes. Simultaneous with the drop in proton temperature the helium and electron temperature decreased abruptly. In some cases the proton temperature depression was accompanied by a moderate increase in magnetic field magnitude with an unusually low variance and by an increase in the ratio of parallel to perpendicular temperature. The drive gas usually displayed a bi-directional flow of suprathermal solar wind electrons at higher energies (>137 eV).

22079 (MPI-PAE/EXTRATERR—169) **Observations of fast, transient gamma ray phenomena.** Kouveliotou, C. (Max-Planck-Institut fuer Physik und Astrophysik, Garching (Germany, F.R.). Inst. fuer Extraterrestrische Physik). Sep 1981. 207p. NTIS, PC A10/MF A01.

The International Sun/Earth Explorer 3 (ISEE) 3 gamma-ray burst (GRB) data are analyzed for cosmic and solar events. The ISEE 3 data are compared to an inter and an extragalactic source model. The satellite data agree best with the galactic model of thermonuclear runaway initiated by carbon detonation after the accretion of matter onto a neutron star. A GRB classification based on time structure similarities is proposed: spikes, singles, doubles, and multiples. Three of the solar GRB's come from the same flaring region and have high cross correlation coefficients. This suggests that the flare phenomenon is not catastrophic for the magnetic field configurations involved. The increasing temperature in the region of trapped plasma after the electron injection causes shrinking at the rising flank of the event as event absolute maximum approaches. For homologous events, a 1 day recharging period is indicated. Events either have decay times faster than 10 sec or slower than 20 sec. No such trend is seen in rise times. (ESA)

22080 (N—82-18246) **Isotopic stack - measurement of heavy cosmic ray isotopes.** Beaujean, R. (Kiel Univ. (Germany, F.R.)). Nov 1981. 3p. NTIS, PC A08/MF A01.

In NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions 3 p (SEE N82-18234 09-12).

Heavy cosmic ray nuclei with nuclear charge, Z, equal to or greater than 3 are to be measured using an isotopic stack consisting of passive visual track detectors which remain sensitive throughout the entire mission. The scientific data are stored in latent tracks which are produced by heavy ions and which can be revealed in the investigator's laboratory after recovery. During the mission, only housekeeping data have to be collected. The exposure onboard Spacelab 1 allows the study of the chemical composition and energy spectrum of particles which have energies in the range 20 to 100 million electron volts per atomic mass unit, as well as the isotopic composition of heavy galactic cosmic rays with energies in the range 100 to 1000 million electron volts per atomic mass unit.

22081 (N—82-18251) **Spectroscopy in x-ray astronomy.** Andresen, R. (European Space Technology Center, Delft (Netherlands)). Nov 1981. 3p. NTIS, PC A08/MF A01.

In NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions 3 p (SEE N82-18234 09-12).

Detailed features in cosmic X-ray sources and their associated temporal variation over a wide energy range were studied. Excess emission and absorption at approximately 6 to 7 kiloelectron volts in the spectra of supernova remnants, binary X-ray sources, and clusters of galaxies were observed. A gas scintillation proportional counter (GSPC) will be used as the detector system. In the gas scintillator the principal limitation is due to the statistics of the initial ionization process only.

22082 (N—82-18253) **Measurement of the solar constant.** Crommelynck, D. (Institut Royal Meteorologique de Belgique, Brussels). Nov 1981. 3p. NTIS, PC A08/MF A01.

In NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions 3 p (SEE N82-18234 09-12).

The absolute value of the solar constant and the long term variations that exist in the absolute value of the solar constant were measured. The solar constant is the total irradiance of the Sun at a distance of one astronomical unit. An absolute radiometer removed from the effects of the atmosphere with its calibration tested in situ was used to measure the solar constant. The importance of an accurate knowledge of the solar constant is emphasized.

22083 (N—82-18254) **Solar spectrum from 170 to 3200 nanometers.** Thuillier, G. (Centre National de la Recherche Scientifique, 75 - Paris (France)). Nov 1981. 3p. NTIS, PC A08/MF A01.

In NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions 3 p (SEE N82-18234 09-12).

The spectral irradiance of the Sun between 170 and 3200 nanometers was measured to determine accurately the solar constant, its possible variation with the solar cycle, and the wavelength range responsible for the observed variations. It is pointed out that measurements over very long time periods (10 years) involving flights of the same instrument on future Spacelab missions will be required. Few spectral solar irradiation measurements ranging from the near ultraviolet to the near infrared have been performed yet. The most extensive solar irradiation measurements were obtained by a spectrometer onboard an aircraft or from high altitude observatories. The full disk irradiation flux was measured, corrections for atmospheric absorption are applied in all of the measurements.

22084 (N—82-21120) **Gamma ray observations of the solar system.** (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center). 1981. 6p. NTIS (US Sales Only).

Two general categories are discussed concerning the evolution of the solar system: the dualistic view, the planetesimal approach and the monistic view, the nebular hypothesis. The major points of each view are given and the models that are developed from these views are described. Possible applications of gamma ray astronomical observations to the question of the dynamic evolution of the solar system are discussed.

22085 (N—82-21122) **Solar observations.** (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center). 1981. 28p. NTIS (US Sales Only).

High energy processes that take place in the Sun's atmosphere and the relationship of these phenomena to the basic problems of solar activity are discussed. Gamma ray emission exhibits characteristics of the conditions in regions where accelerated high energy particles interact. A number of gamma ray production mechanisms are considered. These include: the Compton effect, magnetobremsstrahlung, pi meson production by proton-proton interaction or by proton-antiproton annihilation, fission and neutral of charged particle radiative capture on inelastic scatter.

22086 (N—82-21123) **The interstellar medium and galactic structure.** (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center). 1981. 32p. NTIS (US Sales Only).

High energy gamma rays are produced by the interaction of cosmic rays with the interstellar matter in the galaxy. By combining the gamma ray information with radio data, a picture of the galaxy is presented with regard to the general structure and the effects of cosmic ray pressure. The interaction processes and galactic matter distribution are discussed. Galactic cosmic ray distribution and current gamma ray results are reported.

22087 (N—82-21124) **Compact objects.** (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center). 1981. 29p. NTIS PC$10.00/MF A01.

Various types of objects and phenomena and their significance in high energy astrophysics are discussed. The current concepts of the nature of the objects and the mechanisms generating high energy electromagnetic radiation are also discussed. Current observational data is presented. Objects of special interest include black holes, supernova remnants, neutron stars, and pulsars.

22088 (N—82-21125) **Galaxies.** (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center). 1981. 21p. NTIS (US Sales Only).

Normal galaxies, radio galaxies, and Seyfert galaxies are considered. The large magellanic cloud and the great galaxy in Andromedia are highlighted. Quasars and BL lacertae objects are also discussed and a review of the spectral observations of all of these galaxies and celestial objects is presented.

22089 (N—82-21126) **Cosmology.** (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center). 1981. 15p. NTIS PC$10.00/MF A01.

The current view of the universe is summarized. The equations used to described it and the means of interpreting the diffuse gamma radiation which might result from phenomena which occurred in the distant past are described. The Friedmann model is described in detail.

22090 (N—82-21127) **Diffuse radiation.** (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center). 1981. 21p. NTIS, PC A01.

A diffuse celestial radiation which is isotropic at least on a course scale were measured from the soft X-ray region to about 150 MeV, at which energy the intensity falls below that of the galactic emission for most galactic latitudes. The spectral shape, the intensity, and the established degree of isotropy of this diffuse radiation already place severe constraints on the possible explanations for this radiation. Among the extragalactic theories, the more promising explanations of the isotropic diffuse emission appear to be radiation from exceptional galaxies from matter antimatter annihilation at the boundaries of superclusters of galaxies of matter and antimatter in baryon symmetric big bang models. Other possible sources for extragalactic diffuse gamma radiation are discussed and include normal galaxies, clusters of galaxies, primordial cosmic rays interacting with intergalactic matter, primordial black holes, and cosmic ray leakage from galaxies.

22091 (N—82-21128) **Gamma ray interaction processes.** (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center). 1981. 18p. NTIS PC$10.00/MF A01.

Gamma ray detection in the energy region above 1 keV involves measurements of the energy exchange or energy loss between the gamma ray and the mass of the detector. In most cases of interest, it is the kinetic energy imparted to charged particles by the gamma ray which is lost in the detector and measured in order to obtain spectral knowledge between the incident gamma ray photon and the direction of the secondary particles contains important energy information. The interaction gamma ray removal processes in matter are considered. This interaction removal process is characterized by the fact that each gamma ray is removed individually from the incident beam. The number of photons removed in this manner is proportional to the thickness of matter traversed.

22092 (N—82-21129) **Detectors for energies less than 10 MeV.** (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center). 1981. 57p. NTIS (US Sales Only).

In the energy domain 100 keV to 10 MeV, both crystal scintillations and semiconductors are widely used for gamma ray detectors in spectrometer systems. These detectors' operation depend on the fact that gamma rays lose energy by ionization in these materials and electrons and holes are produced. In the case of semiconductors, these electrons and holes are collected by an electric field, and they provide an electric signal that is a direct measure of the energy lost by the gamma ray in the material. Scintillation detectors depend on a further conversion of the energy lost in electron hole pair production to the production of photons. A photomultiplier tube measures the intensity of the photon flux, and an electrical pulse proportional to the photon intensity is produced at the photomultiplier output.

22093 (N—82-21130) **Detectors for energies greater than 10 MeV.** (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center). 1981. 32p. NTIS (US Sales Only).

The detector telescopes used in gamma ray astronomy in general are more similar to particle detectors than to optical devices, since the high frequency of the radiation precludes the use of reflection or diffraction techniques, but the high energy content of each photon does enable them to be detected with scintillators, track imaging chambers, and solid state detectors. Within the gamma ray range, the basic design of the instrument changes as the energy of the gamma ray exceeds 10 to 20 MeV, and therefore, moves from the region where the Compton effect predominates in the absorption of the gamma ray to that where electron pair production is most important. In the energy range from 10 to 20 MeV to several times 10,000 MeV, gamma ray telescopes are usually built so that the electron pair may be seen and the properties of the electrons measured.

22094 **(N—82-21131) Analysis of observational spectra.** (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center). 1981. 46p. NTIS PC$10.00/MF A01.

The first step in the analysis of gamma ray energy loss spectra is their conversion to differential energy and differential angular photon spectra. This conversion can be carried out if the detector response and the background are both known. Once these parameters are known, there are many techniques that can be used to convert pulse height spectra to photon spectra. These techniques are discussed and background problems are considered. Emphasis is placed on the analysis of energy loss spectra in the lower gamma ray energy domain. Problems of transportations from pulse height to photon space are most complex in this domain and the methods shown illustrate many of the problems which arise in the general analysis of energy loss spectra.

22095 **(N—82-22115) Isolated grain condensation behavior: computation methods and first results. Final report.** Lewis, J.S. (Lewis (John S.) Associates, Inc., Natick, MA (USA)). Feb 1982. 12p. NTIS, PC A03/MF A01.

A set of efficient programs for calculation of condensation behavior in a system with either solar or carbon-rich elemental composition was developed to treat the course of condensation at very low pressures. These programs were applied to the problem of condensation at very low pressures. The minerals produced in the stellar and nova-related processes under study, including carriers of important volatile elements such as carbon and nitrogen, are candidates for accretion into meteorite parent bodies and planets, and may still be discernible in the enstatite chondrites.

22096 **(N—82-25031) Observations of b-type supergiants.** (National Aeronautics and Space Administration, Washington, DC (USA)). 1982. 68p. NTIS, PC A23/MF A01.

In its B Stars With and Without Emission Lines, Parts 1 and 2 p 79-146 (SEE N82-25027 15-88).

Methods are presented for determining the effective temperatures, radii and bolometric corrections for B-type supergiants. Absorption lines from hydrogen and from other elements, the H alpha, Balmer progression, and evidence for outflow from the invisible spectrum of these supergiants are considered. Luminosity effects, outflow velocities, and variability in the UV spectrum at high resolution are examined as well as the infrared and radio spectra. Spectroscopic characteristics of the peculiar supergiant P Cyg and superluminous supergiants, X-ray binaries, the properties of the photosphere and mantle and mass loss are elaborated. A general model for the mantle of B stars is included and the properties of B type stars in the main sequence are compared with those of the B-type supergiants.

22097 **(N—82-25037) Data obtained from spacecraft.** (National Aeronautics and Space Administration, Washington, DC (USA)). 1982. 33p. NTIS, PC A23/MF A01.

In its B Stars With and Without Emission Lines, Parts 1 and 2 p 375-407 (SEE N82-25027 15-88).

Data from spacecraft observations of B stars in the ultraviolet and X-ray spectral regions are presented. Superionization, mass flux, and the extended envelope are discussed in reference to ultraviolet line spectral. The problem of determining the ultraviolet flux of the B stars is examined. Spectral variations of gamma Cas and 59 Cyg are also discussed.

22098 **(N—82-25059) Infrared absorption by OH containing compounds.** Hillman, J.J. (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center). Apr 1982. 15p. NTIS, PC A18/MF A01.

In its Vibrational-Rotational Spectry. for Planetary Atmospheres, Vol. 1 p 295-310 (SEE N82-25043 15-91) REFS.

The spectroscopy of the species H_2O, H_2O_2, and HO_2 are discussed. Their vibration rotation transitions are emphasized, but the pure rotational transitions in the vibrational ground state of H_2O are also considered since they contribute to opacity in the middle infrared region.

22099 **(N—82-25060) Infrared absorption of sulfur bearing compounds.** Maki, A. (National Bureau of Standards, Washington, DC (USA)). Apr 1982. 20p. NTIS, PC A18/MF A01.

In NASA. Goddard Space Flight Center Vibrational-Rotational Spectry. for Planetary Atmospheres, Vol. 1 p 311-330 (SEE N82-25043 15-91) REFS.

The sulfur bearing molecules of most interest in studies of planetary atmospheres are the simple, stable hydrides and oxides, H_2S, H_2SO_4, SO_2, and SO_3, and the carbon containing species OCS and CO_2. For interpreting spectroscopic observations, the properties that must be known are: transition frequencies, transition intensities, transition assignments in terms of quantum number assignments and lower state energy levels, and pressure broadening constants (including their temperature dependence).

22100 **(N—82-25077) Why solar flares are studied.** Mangeney, A. (Observatoire de Paris, Section de Meudon, 92 (France)). 1981. 4p. (French). NTIS, PC A07/MF A01.

In its Forum on Solar Activity 4 p (SEE N82-25076 15-92).

Solar flare phenomena of interest in astrophysics and plasma physics are discussed. The situation is considered where a dense region (solar envelope) whose motion is controlled by essentially nonmagnetic processes, e.g., convective instabilities, tranfers nonradiative energy to a tenuous region (solar atmosphere) whose motion, on the contrary, is controlled by the magnetic field. A dimensional analysis of the equation of motion is shown in terms of the beta parameter. A force-free magnetic field in the atmosphere is arrived at. Evaluation of force-free equilibria gives the potential field. Motion in the envelope incessantly modifies the magnetic field configuration, while free energy is stored in the atmosphere. Unanswered questions as to the characterization of the dissipation of this energy are evoked.

22101 **(N—82-25078) Flares and dynamic aspects.** Hanssen, E.T. (National Aeronautics and Space Administration, Huntsville, AL (USA). George C. Marshall Space Flight Center). 1981. 13p. (French). NTIS, PC A07/MF A01.

In Obs. de Paris-Meudon Forum on Solar Activity 13 p (SEE N82-25076 15-92) REFS.

Theory of the dynamic nature of solar flares, eruptive prominences, and coronal transients is surveyed. Two types of flare are considered: compact eruptions (small flares) which are probably loops, and large eruptions of double filament flares. The physical sense of this classification is justified, using solar observations. Even leaving the question unanswered of whether a coronal transient is a loop of ejected matter or a shock wave, the important, perhaps fundamental, role of mass motion in flare physics is evidenced.

22102 **(N—82-25079) Spectroscopic diagnostics of solar flares.** Bely-Dubau, F. (Observatoire de Paris-Meudon); Dubau, J. (Observatoire de Paris-Meudon); Faucher, P. (Observatoire de Nice, 06 (France)). 1981. 14p. (French). NTIS, PC A07/MF A01.

In Obs. de Paris-Meudon Forum on Solar Activity 14 p (SEE N82-25076 15-92) REFS.

Observations made with the X-ray polychromator (XRP) on board the Solar Maximum Mission satellite were analyzed. Data from the bent crystal spectrometer portion of the XRP experiment, in the spectral domain 1 to 3 A, with high spectral and temporal resolution, were used. Results for the spectrum analysis of iron are given. The possibility of polarization effects is considered. Although it is demonstrated that hyperfine analyses of a given spectrum are obtainable, provided calculations include large quantities of high precision atomic data, the interpretation is limited by the hypothesis of homogeneity of the emitting plasma.

22103 **(N—82-25080) Determination of magnetic fields and anisotropies of a milieu from interpretation of the linear polarization of lines.** Sahal-Brechot, S. (Observatoire de Paris, Section de Meudon, 92 (France)). 1981. 28p. (French). NTIS, PC A07/MF A01.

In Obs. de Paris-Meudon Forum on Solar Activity 28 p (SEE N82-25076 15-92) REFS.

Research in atomic physics was applied to polarimetric observations of solar prominences and flares. Attempts to measure both the magnetic field in magnitude and direction of the magnetic field as well as the velocity field are described. Two causes behind the global polarization of a line are explained: excitation by a directional ray, and directional collisions. Causes which can lead to a modification of this global polarization, particularly by a magnetic field (Hanle effect), are examined. While interpretation of the Hanle effect gives a measure of the magnetic field vector, analysis of the polarization of a line profile provides information on the velocity field vector, arriving at a simultaneous vector detection scheme.

22104 (N—82-25081) The sites of solar flares. Mein, P. (Observatoire de Paris, Section de Meudon, 92 (France)). 1981. 7p. (French). NTIS, PC A07/MF A01.

In Obs. de Paris-Meudon Forum on Solar Activity 7 p (SEE N82-25076 15-92) REFS.

Observations of solar flares were studied. Results on the magnetic field structure associated with an elementary flare are discussed. Conditions which prelude the triggering of instabilities (homologous flares, disappearance of filaments) are covered. The post-flare relaxation phase is also considered. Linear polarization of lines during flare events and the variable geometry of magnetic field lines (mass ejection dynamics) are treated. The importance of continuous observation over several hours in interpreting these events is shown.

22105 (N—82-25082) Particle acceleration in solar flares. Simnett, G.M. (Birmingham Univ. (UK)). 1981. 21p. NTIS, PC A07/MF A01.

In Obs. de Paris-Meudon Forum on Solar Activity 21 p (SEE N82-25076 15-92) REFS.

Some contemporary problems relating to the acceleration of charged particles in solar flares are discussed including the how, when, and where of the acceleration. Particular emphasis is given to electron acceleration since electrons are more easily detected via the radiation produced in their interaction with plasma, and magnetic fields. Acceleration in both the impulsive phase and in a shock induced second stage is outlined together with the controversy between thermal and nonthermal processes. Results of studies made during the last solar maximum are considered, together with more recently available spatially resolved radio data, and similar X-ray data from the Solar Maximum Mission. Proton acceleration in the impulsive phase is discussed in relation to the gamma radiation it stimulates. If the corona is an aceleration site, the manifestations of flares so well observed at the lower energies, (optical, EUV, soft X-ray) may well be truly secondary processes with the primary energy release site and particle acceleration region quite remote.

22106 (N—82-25083) Metric emissions in conjunction with solar activity. Lantos, P. (Observatoire de Paris, Section de Meudon, 92 (France)). 1981. 7p. (FRENCH). NTIS, PC A07/MF A01.

In Obs. de Paris-Meudon Forum on Solar Activity 7 p (SEE N82-25076 15-92) REFS.

The temporal sequence as well as localization of the acceleration and injection of electrons necessary for the emission of solar radio bursts are considered. Results obtained with the radioheliograph at Nancy are used along with observations from ISEE 3 and the Solar Maximum Mission. Coronal structures where bursts occur are identified. Parameters, such as evolution, magnetic field, and density, which can be studied by radio astronomy are discussed. Type 3 bursts are associated with the preeruptive and impulsive phases of a flare, while type 2 and 4 bursts go with a flare continuum. A noise storm accompanies the final phase.

22107 (N—82-25085) Recent developments in solar flare models. Heyvaerts, J. (Centre National de la Recherche Scientifique, 75 - Paris (France). Inst. d'Astrophysique). 1981. 21p. (In French). NTIS, PC A07/MF A01.

In Obs. de Paris-Meudon Forum on Solar Activity 21 p (SEE N82-25076 15-92) REFS Prepared in cooperation with Inst. d'Astrophysique, Paris.

Theoretical models which explain why and how solar flares occur are surveyed. Processes that govern the dissipation of magnetic energy are considered fundamental. The storage of magnetic energy and what produces its violent conversion into thermal and suprathermal energy are considered. A magnetic model of a flare which is presented comprises three phases: a stable flare buildup phase evolves into an impulsive phase which leads to the principle phase of a flare phenomenon. The stability of the preeruptive state and current sheets is discussed as well as the thermal equilibrium of the preeruptive structure. Reconnection in the preeruptive state and the occurence of spontaneous reconnection are treated. Results show that reconnection can have different geometries and, hence, can provoke nonlinear developments of widely varying magnitudes in the context of the solar corona.

22108 (N—82-26056) Coronae of nondegenerate single and binary stars: a survey of our present understanding and problems ripe for solution. Linsky, J.L. (Joint Inst. for Lab. Astrophysics, Boulder, CO (USA)). Nov 1981. 24p. NTIS, PC A99/MF A01.

In NASA. Goddard Space Flight Center X-ray Astronomy in the 1980's p 13-36 (SEE N82-26055 16-88) REFS.

Information about the coronae of stars in different portions of the HR diagram, and how the characteristics of such coronae compare with what is known about the solar corona are reviewed. For each type of star, some unanswered questions and the generic type of X-ray instrument required to answer these questions are listed. The survey points out the critical need for a sensitive X-ray instrument with both moderate spectra resolution and imaging capability that can monitor selected targets for long periods of time. There is also a need for high spectral resolution, provided sensitivities can be improved greatly over Einstein, and near simultaneous ultraviolet spectroscopy.

22109 (N—82-26057) Continuum and line spectra of degenerate dwarf x-ray sources. Lamb, D.Q. (Harvard Univ., Cambridge, MA (USA). Center for Astrophysics). Nov 1981. 40p. NTIS, PC A99/MF A01.

In NASA. Goddard Space Flight Center X-ray Astronomy in the 1980's p 37-67 (SEE N82-26055 16-88) REFS.

Recent observations of X-ray sources are summarized. Unresolved issues concerning these sources are discussed and an outline of the kinds of X-ray observations that would best advance the understanding of these sources is presented.

22110 (N—82-26058) Neutron star binaries, pulsars and burst sources. Lamb, F.K. (Illinois Univ., Urbana (USA)). Nov 1981. 30p. NTIS, PC A99/MF A01.

In NASA. Goddard Space Flight Center X-ray Astronomy in the 1980's p 77-106 (SEE N82-26055 16-88) REFS.

Unresolved issues involving neutron star binaries, pulsars, and burst sources are described. Attention is drawn to the types of observations most likely to resolve them. Many of these observations are likely to be carried out during the next decade by one or more missions that have been approved or proposed. Flux measurements with an imaging detector and broad-band spectroscopic studies in the energy range 30-150 keV are discussed. The need for soft X-ray and X-ray observations with an instrument which has arcminute angular resolution and an effective area substantially greater than of ROSAT or EXOSAT is also discussed.

22111 (N—82-26059) X-ray spectroscopic observations and modeling of supernova remnants. Shull, J.M. (Colorado Univ., Boulder (USA); Joint Inst. for Lab. Astrophysics, Boulder, CO (USA)). Nov 1981. 11p. NTIS, PC A99/MF A01.

In NASA. Goddard Space Flight Center X-ray Astronomy in the 1980's p 107-117 (SEE N82-26055 16-88) REFS Prepared in cooperation with the Joint Inst. for Lab. Astrophysics.

The X-ray observations of young remnants and their theoretical interpretation are described. A number of questions concerning the nature of the blast wave interaction with the interstellar gas and grains and of atomic processes in these hot plasmas are considered. It is concluded that future X-ray spectrometers with high collecting area, moderate spectral resolution and good spatial resolution can make important contributions to the understanding of supernova remnants in the Milky Way and neighboring galaxies and of their role in the global chemical and dynamical evolution of the interstellar medium.

22112 **(N—82-26060) Interstellar, intracluster and supercluster gas.** Cowie, L.L. (Massachusetts Inst. of Tech., Cambridge (USA)). Nov 1981. 14p. NTIS, PC A99/MF A01.

In NASA. Goddard Space Flight Center X-ray Astronomy in the 1980's p 119-132 (SEE N82-26055 16-88) REFS.

Hot tenuous plasmas with temperatures in the range 1,000,000 to 3.10 to the 8th power K and densities of .000001 to .001 per cu cm are considered. The dominant radiation processes are thermal bremstrahlung and collisional line excitation and all except the very hottest objects will have observable X-ray emissions lines. The most important unifying point is the angular scales involved. For the interstellar gas, structure ranging in size from about 10 ft to tens of degrees is expected.

22113 **(N—82-26062) X-rays from quasars and active galaxies.** Lightman, A.P. (Harvard Univ., Cambridge, MA (USA). Center for Astrophysics). Nov 1981. 40p. NTIS, PC A99/MF A01.

In NASA. Goddard Space Flight Center X-ray Astronomy in the 1980's p 143-182 (SEE N82-26055 16-88) REFS.

Features of quasars and active galactic nuclei are discussed and include: the nature of the power source, the radiation processes, and the mechanism for the formation and collimation of long-lived jets of matter observed to emanate from the center of these of these objects. The phenomena that produce X-rays are highlighted.

22114 **(N—82-26064) X-ray astronomy program in Japan.** Tanaka, Y. (Institute of Space and Astronautical Science, Tokyo (Japan)). Nov 1982. 8p. NTIS, PC A99/MF A01.

In NASA. Goddard Space Flight Center X-ray Astronomy in the 1980's p 219-226 (SEE N82-26055 16-88) REFS.

Hakucho satellite operations and the problems that emerged from the neutron star observations are illustrated. X-ray pulsars and bursters are reviewed. Future satellite programs are outlined.

22115 **(N—82-26065) LAMAR: a high throughput x-ray astronomy facility for a moderate cost mission.** Gorenstein, P.; Schwartz, D. (Harvard Univ., Cambridge, MA (USA). Center for Astrophysics). Nov 1981. 43p. NTIS, PC A99/MF A01.

In NASA. Goddard Space Flight Center X-ray Astronomy in the 1980's p 227-269 (SEE N82-26055 16-88) REFS.

The performance of a large area modular array of reflectors (LAMAR) is considered in several hypothetical observations relevant to: (1) cosmology, the X-ray background, and large scale structure of the universe (2) clusters of galaxies and their evolution (3) quasars and other active galactic nuclei (4) compact objects in our galaxy (5) stellar coronae and (6) energy input to the interstellar medium.

22116 **(N—82-26066) Wolter type i LAMAR.** Catura, R.C.; Joki, E.G. (Lockheed Missiles and Space Co., Palo Alto, CA (USA)). Nov 1981. 17p. NTIS, PC A99/MF A01.

In NASA. Goddard Space Flight Center X-ray Astronomy in the 1980's p 271-287 (SEE N82-26055 16-88) REFS.

Observational objectives for the LAMAR and their influence on the instrument design are discussed. It is concluded that the most important design parameter is the angular resolution of the LAMAR modules since it so strongly influences sensitivity, optical identifications, source confusion, spectral resolution for objective gratings and the ability to resolve small extended sources. A high resolution Wolter Type I LAMAR module is described, its hardware status discussed, and the performance of a LAMAR observatory presented. A promising technique for enhancing the reflectivity of Wolter Type I X-ray optics in a selected bandpass at high energy has been investigated and the performance of the LAMAR module, utilizing this method, has been calculated.

22117 **(N—82-26072) Hard x-ray imaging from explorer.** Grindlay, J.E.; Murray, S.S. (Harvard Univ., Cambridge, MA (USA). Center for Astrophysics). Nov 1981. 18p. NTIS, PC A99/MF A01.

In NASA. Goddard Space Flight Center X-ray Astronomy in the 1980's p 349-366 (SEE N82-26055 16-88) REFS.

Coded aperture X-ray detectors were applied to obtain large increases in sensitivity as well as angular resolution. A hard X-ray coded aperture detector concept is described which enables very high sensitivity studies persistent hard X-ray sources and gamma ray bursts. Coded aperture imaging is employed so that approx. 2 min source locations can be derived within a 3 deg field of view. Gamma bursts were located initially to within approx. 2 deg and X-ray/hard X-ray spectra and timing, as well as precise locations, derived for possible burst afterglow emission. It is suggested that hard X-ray imaging should be conducted from an Explorer mission where long exposure times are possible.

22118 **(N—82-26073) Stellar coronal x-ray explorer: STCOEX.** Vaiana, G.S. (Harvard Univ., Cambridge, MA (USA). Center for Astrophysics). Nov 1981. 7p. NTIS, PC A99/MF A01.

In NASA. Goddard Space Flight Center X-ray Astronomy in the 1980's p 371-377 (SEE N82-26055 16-88) REFS.

The status of the newly born field of stellar X-ray astronomy is considered. The need for further observational capability, the study of stellar surface activity and the development of design criteria for a follow-up mission, with primary emphasis on stellar observations and with general capabilities within the scope of the Explorer program are examined. The criteria which lead to the desired instrumental capabilities are reviewed and an overview of the proposed instrument and some of its capabilities, as indicated by simulations is presented. Two versions of a trial payload the stellar coronal. Explorer (STCOEX) which meet the observational desirable are developed.

22119 **(N—82-26077) Broad band x-ray telescope (BBXRT).** Serlemitsos, P.J. (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center). Nov 1981. 20p. NTIS, PC A99/MF A01.

In its X-ray Astronomy in the 1980's p 441-460 (SEE N82-26055 16-88) REFS.

An approach along with corroborating measurements for significantly enhancing the potential of Si(Li) spectrophotometry in X-ray astronomy is presented. The key new element is an unconventional X-ray mirror that meets qualifications of low cost, light weight, and large throughput over a broad energy band at moderate angular resolution. The potential for other applications is also discussed.

22120 **(N—82-26078) Some observational tests of x-ray pulsar emission models.** Meszaros, P. (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center). Nov 1981. 9p. NTIS, PC A99/MF A01.

In its X-ray Astronomy in the 1980's p 461-469 (SEE N82-26055 16-88) REFS.

The understanding of neutron star physics which relies heavily on knowing values of their mass, radius and magnetic field strength was studied. The only information about these till now comes from the surface radiation. Major uncertainties concerning the nature of the mass exchange and the accretion flow, the magnetopause structure, the infall deceleration, the actual pulsation mechanism and the atmosphere geometry are examined. The alternatives and several possible observational tests are discussed.

22121 **(N—82-26079) Observability of atomic line features in strong magnetic fields.** Wunner, G.; Ruder, H.; Herold, H.; Truemper, J. (Erlangen-Nuernberg Univ., Erlangen (Germany, F.R.)). Nov 1981. 6p. NTIS, PC A99/MF A01.

In NASA. Goddard Space Flight Center X-ray Astronomy in the 1980's p 471-476 (SEE N82-26055 16-88) REFS Sponsored in part by Deutsche Forschungsmeinschaft.

The physical properties of atoms in superstrong magnetic fields, characteristic of neutron stars, and the possibility of detecting magnetically strongly shifted atomic lines in the spectra of magnetized X-ray pulsars are discussed. It is suggested that it is recommendable to look for magnetically strongly shifted Fe 26 Lyman lines in rotating neutron stars of not too high luminosity using spectrometers working in the energy range 10 - 20 keV, with sensitivities to minus 4 power photons per sq cm and second, and resolution E/delta E approx. 10-100.

22122 (N—82-26080) A new method for focusing and imaging x-rays and gamma-rays with diffraction crystals. Smither, R.K. (Argonne National Lab., IL (USA)). Nov 1981. 19p. NTIS, PC A99/MF A01.

In NASA. Goddard Space Flight Center X-ray Astronomy in the 1980's p 477-495 (SEE N82-26055 16-88) REFS.

Bent diffraction crystals in which the intercrystalline-plane spacing is varied as a function of position in the crystal are used to focus monochromatic radiation from a point source or parallel beam down to a point image. Conversely, radiation from a point source can be focused into an outgoing parallel beam. The Bragg angle for diffraction of monochromatic radiation will now vary as a function of position in the crystal and this new degree of freedom is used to obtain focusing and imaging of the diffracted beam. This approach to focusing and imaging is applied to the design of a large-area, high resolution X-ray telescope that is also a high resolution monochromator with the unique feature that the width of the energy increment that is diffracted can be controlled and varied during the operation of the instrument. The field can be scanned with a wide energy increment and then switched to a narrow energy increment for the high resolution work. Both transmission and reflection type diffraction crystals can be used.

22123 (N—82-26084) Spectroscopy in the 10 kev to 10 mev range. Matteson, J.L. (California Univ., San Diego (USA)). Nov 1981. 18p. NTIS, PC A99/MF A01.

In NASA. Goddard Space Flight Center X-ray Astronomy in the 1980's p 549-566 (SEE N82-26055 16-88) REFS.

Spectral lines in the 10 keV to 1 MeV range carry information of fundamental importance on many astronomical objects. Since the lines are directly related to specific physical processes this information is model independent and gives the physical conditions in the objects. At the sensitivities achieved to date, approximately 0.0001 to 0.001 phsq cm. sec for steady sources and approximately 0.01 to 1 ph/sq cm sec for transient sources, lines were detected from the galactic center, gamma-ray bursts and transients, X-ray pulsators, the Crab pulsar and solar flares. Future instruments with a factor of approximately 100 sensitivity improvement will allow detailed spectroscopic study of these classes of objects as well as supernova remnants, active galaxies and the interstellar medium. This sensitivity improvement can be obtained through the use of detector technology already proven in balloon and satellite instruments.

22124 (N—82-26085) Spectroscopy from 2 to 200 kev. Helfand, D.J. (Sandia Lab., Albuquerque); Chanan, G.A. (Bell Telephone Labs.). (Columbia Univ., New York (USA)). Nov 1981. 32p. NTIS, PC A99/MF A01.

In NASA. Goddard Space Flight Center X-ray Astronomy in the 1980's p 567-598 (SEE N82-26055 16-88) REFS.

The astrophysical processes responsible for line and continuum emission in the spectra range 2 keV to 200 keV are examined from the viewpoint of designing a spectrometer which would operate in this regime. Phenomena considered include fluorescent line radiation in X-ray binaries, magnetically shifted iron lines and cyclotron emission from neutron star surfaces, line emission from cosmically abundant elements in thermal plasmas, and nuclear deexcitation lines in fresh nucleosynthetically produced matter. An instrument consisting of a approximately 10 sq cm array of planar germanium detectors surrounded by a large sodium-iodide anticoincidence shield is described and projected background rates and sensitivities are considered. A sample observing program for a two-day shuttle-based mission is included as an example of the wide range of scientific questions which could be addressed by such an instrument.

22125 (N—82-26086) Hard x-ray astrophysics. Rothschild, R.E. (California Univ., San Diego (USA)). Nov 1981. 21p. NTIS, PC A99/MF A01.

In NASA. Goddard Space Flight Center X-ray Astronomy in the 1980's p 599-620 (SEE N82-26055 16-88) REFS.

Past hard X-ray and lower energy satellite instruments are reviewed and it is shown that observation above 20 keV and up to hundreds of keV can provide much valuable information on the astrophysics of cosmic sources. To calculate possible sensitivities of future arrays, the efficiencies of a one-atmosphere inch gas counter (the HEAO-1 A-2 xenon filled HED3) and a 3 mm phoswich scintillator (the HEAO-1 A-4 NaI LED1) were compared. Above 15 keV, the scintillator was more efficient. In a similar comparison, the sensitivity of germanium detectors did not differ much from that of the scintillators, except at high energies where the sensitivity would remain flat and not rise with loss of efficiency. Questions to be addressed concerning the physics of active galaxies and the diffuse radiation background, black holes, radio pulsars, X-ray pulsars, and galactic clusters are examined.

22126 (N—82-26088) Plasma phase of the evolution of the solar system. Alfven, H. (Royal Inst. of Tech., Stockholm (Sweden)). Nov 1981. 8p. NTIS, PC A12/MF A01.

In ESA The Solar System and its Exploration p 3-10 (SEE N82-26087 16-88) REFS.

Magnetospheric research and laboratory evidence are used to argue that plasma dominated processes were essential for the evolution of interstellar clouds and of circumsolar cloud up to the transition from the plasma to the planetesimal phase. Interstellar clouds could be formed by electromagnetic contraction which would also increase cloud density, bringing it to the limit of gravitational collapse without recourse to a triggering mechanism. In a dusty plasma cloud, large particles serve as a core around which gaseous components can collapse. The inhomogeneity of the clouds causes them to fragment into stellesimals which accrete into protostars. Planets are formed in a semistationary process by matter from the primeval cloud penetrating a void around the protostar. Satellites are formed similarly. Chemically differentiated small clouds of neutral gas and dust reach the central body via a low plasma density region. The gas is stopped and ionized when it attains the critical velocity. This explains the band structure of the solar system.

22127 (N—82-26090) The sun as a star. Deinzer, W. (Universitaets-Sternwarte Goettingen, Germany (F.R.)). Nov 1981. 4p. NTIS, PC A12/MF A01.

In ESA The Solar System and its Exploration p 25-28 (SEE N82-26087 16-88) REFS.

The Sun and the theory of stellar structure, solar rotation, the solar cycle, and the solar magnetic field are discussed. The validity of solar models which adjust Prandtl's mixing length and helium abundance so that radius and luminosity match their solar values is tested. The fragmentary state of turbulence theory prevents investigation of the hydrogen convection zone from providing quantitative validation. Evidence based on solar neutrino flux and nonradial solar oscillations is not decisive. The transport of angular momentum towards the equator, resulting in differential rotation, could be due to anisotropic viscosity caused by turbulent eddies in the convection zone, Rossby waves, or convection. The pairwise appearance of sunspots and their migration towards lower latitudes are accounted for in numerical solutions of the modified induction equation. These show that strong toroidal flux tubes, of opposite sign in each half cycle, are produced.

22128 (N—82-26091) The solar atmosphere: from photosphere to corona. Jordan, C. (Oxford Univ. (UK)). Nov 1981. 11p. NTIS, PC A12/MF A01.

In ESA The Solar System and its Exploration p 29-39 (SEE N82-26087 16-88) REFS.

Developments in solar physics, emphasizing areas where observations from space contribute substantially, are reviewed. Progress in establishing the temperature and density structure of the outer solar layers is made through measurements of emission line fluxes in the extreme UV and X-ray wavelengths combined with spatial information from imaging instruments. The processes by which the corona and other hot plasma are heated remain elusive. Although the source of the heating is considered to be the interaction between gas motions and the magnetic fields in the subphotospheric convective zone, the means by which energy is transported and dissipated are unknown. Observations required to limit the range of possible mechanisms are discussed.

22129 (N—82-26093) The international solar polar mission (ISPM). Marsden, R.G.; Wenzel, K.P. (European Space Research and Technology Centre, Noordwijk (Netherlands)). Nov 1981. 9p. NTIS, PC A12/MF A01.

In ESA The Solar System and its Exploration p 51-59 (SEE N82-26087 16-88) REFS.

The instrumentation and mission objectives of ISPM are described. The ISPM explores the heliosphere within a few astronomical units of the Sun over the full range of heliographic latitudes. The prime mission objective is to study, as a function of solar latitude, the properties of the interplanetary medium and solar corona. It uses a Jupiter gravity-assist to achieve a high solar latitude trajectory. The scientific instrumentation is designed to explore, in the third heliospheric dimension, the properties of the solar corona, the solar wind, the Sun-wind interface, the heliospheric magnetic field, solar radio bursts and plasma waves, solar and galactic cosmic rays, and interplanetary/interstellar neutral dust and gas.

22130 **(N—82-26135) H_2 and HD spectroscopic status.** Margolis, J.S. (Jet Propulsion Lab., Pasadena, CA (USA)). Apr 1982. 7p. NTIS, PC A11/MF A01.

In NASA. Goddard Space Flight Center Vibrational-Rotational Spectry. for Planetary Atmospheres, Vol. 2 p 431-437 (SEE N82-26134 16-91) REFS.

HD spectra was studied in the UV about as thoroughly as those of H_2. The vibration-rotation line positions are known. However, the theory does not do well in calculating the absorption strengths. These tend to be stronger than the quadrupole strengths for H_2 and so more lines were measured. The state of knowledge of the HD line positions of vibration-rotation constants is summarized. The HD absorption strength measurements are also summarized. A summary of absorption strengths for HD is tabulated.

22131 **(N—82-26136) Collision induced sharp features in the infrared spectrum of HD.** Herman, R.M. (Pennsylvania State Univ., University Park (USA)). Apr 1982. 9p. NTIS, PC A11/MF A01.

In NASA. Goddard Space Flight Center Vibrational-Rotational Spectry. for Planetary Atmospheres, Vol. 2 p 439-447 (SEE N82-26134 16-91) REFS.

The collision induced spectra of HD and H_2 are studied. Their application to the study of planetary (and planetary satellite) atmospheres is investigated.

22132 **(N—82-26144) Current studies of CH_3D: ye olde line drive.** Lutz, B.L. (Lowell Observatory, Flagstaff, AZ (USA). Planetary Research Center). Apr 1982. 12p. NTIS, PC A11/MF A01.

In NASA. Goddard Space Flight Center Vibrational-Rotational Spectry. Planetary Atmospheres, Vol. 2 p 599-610 (SEE N82-26134 16-91) REFS.

The CH_3D molecule is an intermediate methane which has immediate importance in the study of the chemical composition of the outer planets. The deuterium present in the atmospheres of the giant planets is thought to be representative of the protosolar composition, a quantity of high interest to cosmogonists and to cosmologists. The values of D/H range from about .0002 in the interstellar medium to .00016 in sea water here on Earth. The CH_3D molecule was examined as a probe of the D/H ratio.

22133 **(NASA-CR—161985) Terrestrial cooling and solar variability. Final report.** Agee, E.M. (Universities Space Research Association, Boulder, CO (USA)). Feb 1982. 55p. NTIS, PC A04/MF A01.

Observational evidence from surface temperature records is presented and discussed which suggests a significant cooling trend over the Northern Hemisphere from 1940 to the present. This cooling trend is associated with an increase of the latitudinal gradient of temperature and the lapse rate, as predicted by climate models with decreased solar input and feedback mechanisms. Evidence suggests that four of these 80- to 100-year cycles of global surface temperature fluctuation may have occurred, and in succession, from 1600 to the present. Interpretation of sunspot activity were used to infer a direct thermal response of terrestrial temperature to solar variability on the time scale of the Gleissberg cycle (90 years, an amplitude of the 11-year cycles). A physical link between the sunspot activity and the solar parameter is hypothesized. Observations of sensible heat flux by stationary planetary waves and transient eddies, as well as general circulation modeling results of these processes, were examined from the viewpoint of the hypothesis of cooling due to reduced insolation.

22134 **(NASA-CR—165918) Definition study for an advanced cosmic ray experiment utilizing the long duration exposure facility. Final report, 17 July 1980-30 September 1981.** Price, P.B. (California Univ., Berkeley (USA)). Jun 1982. 56p. NTIS, PC A04/MF A01.

To achieve the goals of cosmic ray astrophysics, an ultraheavy cosmic ray experiment on an LDEF reflight should be in an orbit with high inclination (approximately 57 deg) at approximately 230 nm for approximately 2 years near solar minimum (approximately 1986). It should fill 61 trays. Each tray should contain 4 modules of total active area 0.7 sq m, with a thermal blanket, thermal labyrinth mounts, aluminum honeycomb mechanical support, and total weight approximately 100 kg. Each module should contain interleaved CR39, Lexan, and thin copper sheets plus one event-thermometer canned in a thin metal cannister sealed with approximately 0.2 atm dry O2. The CR39 and Lexan should be manufactured to specifications and the sheet copper rolled to specifications. The event-thermometer should be a stiffened CR39 sheet that slides via bimetal strips relative to fixed CR39 sheet so that stack temperature can be read out for each event. The metal cannister can be collapsed at launch and landing, capturing the sliding assembly to prevent damage. An engineering study should be made of a prototype LDEF tray this will include thermal and mechanical tests of detectors and the event thermometer.

22135 **(NASA-CR—166786) Solar diameter measurements for study of sun climate coupling. Final report, June 1980-May 1981.** Hill, H.A. (Arizona Univ., Tucson (USA)). Sep 1981. 11p. NTIS, PC A02/MF A01.

Variability in solar shape and diameters was examined as a possible probe of an important climatic driving function, solar luminosity variability. The techniques and facilities developed for measuring the solar diameter were used. The observing program and the requisite data reduction were conducted simultaneously. The development of a technique to calibrate the scale in the telescope field progressed to the design and construction phase.

22136 **(NASA-CR—168638) The differential emission measure of dynamic coronal loops.** Antiochos, S.K. (Stanford Univ., CA (USA)). Dec 1981. 10p. NTIS, PC A02/MF A01.

The effects of time dependent phenomena, such as flare energization and decay, on the temperature and density structure of the transition region and, in particular, on the form of the differential emission measure are studied. It is found that unlike the case of the static models, the form of the differential emission measure can be used to determine the important physical mechanisms in the dynamic models.

22137 **(NASA-CR—168703) Evolution of x-ray astronomy.** Rossj, B. (Massachusetts Inst. of Tech., Cambridge (USA)). 1981. 33p. NTIS, PC A03/MF A01.

REFS Presented at the Plasma Astrophys. Course and Workshop, Varenna, Italy, 27 Aug. - 7 Sep. 1981.

The evolution of X-ray astronomy up to the launching of the Einstein observatory is presented. The evaluation proceeded through the following major steps: (1) discovery of an extrasolar X-ray source, Sco X-1, orders of magnitude stronger than astronomers believed might exist (2) identification of a strong X-ray source with the Crab Nebula (3) identification of Sco X-1 with a faint, peculiar optical object (4) demonstration that X-ray stars are binary systems, each consisting of a collapsed object accreting matter from an ordinary star (5) discovery of X-ray bursts (6) discovery of exceedingly strong X-ray emission from active galaxies, quasars and clusters of galaxies (7) demonstration that the principal X-ray source is a hot gas filling the space between galaxies.

22138 **(NASA-CR—168911) Structure of the solar oscillation with period near 160 minutes.** Scherrer, P.H.; Wilcox, J.M. (Stanford Univ., CA (USA)). Feb 1982. 17p. NTIS, PC A02/MF A01.

REFS.

The solar oscillation with period near 160 minutes is found to be unique in a spectrum computed over the range of periods from about 71 to 278 minutes. A best estimate of the period is

160.0095 + or - 0.001 minutes, which is different from 160 minutes (one ninth of a day) by a highly significant amount. The width of the peak is approximately equal to the limiting resolution that can be obtained from an observation lasting 6 years, which suggests that the damping time of the oscillations is considerably longer than 6 years. A suggestion that this peak might be the result of a beating phenomenon between the five minute data averages and a solar oscillation with period near five minutes is shown to be incorrect by recomputing a portion of the spectrum using 15 second data averages.

22139 **(NASA-TM—82168) Complete x-ray sample of the high latitude sky from HEAO-1 A-2: log N log S and luminosity functions.** Piccinotti, G.; Mushotzky, R.F.; Boldt, E.A. Holt, S.S.; Marshall, F.E.; Serlemitsos, P.J.; Shafer, R.A. (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center). Aug 1981. 51p. NTIS, PC A04/MF A01.

REFS Submitted for publication.

An experiment was performed in which a complete X-ray survey of the 8.2 steradians of the sky at galactic latitudes where the absolute value of b is 20 deg down to a limiting sensitivity of 3.1 x ten to the minus 11th power ergs/sq cm sec in the 2-10 keV band. Of the 85 detected sources 17 were identified with galactic objects, 61 were identified with extragalactic objects, and 7 remain unidentified. The log N - log S relation for the non-galactic objects is well fit by the Euclidean relationship. The X-ray spectra of these objects were used to construct log N - log S in physical units. The complete sample of identified sources was used to construct X-ray luminosity functions, using the absolute maximum likelihood method, for clusters galaxies and active galactic nuclei.

22140 **(NASA-TM—82465) Statistical aspects of the 1980 solar flares. 1: Data base, frequency distributions, and overview remarks.** Wilson, R.M. (National Aeronautics and Space Administration, Huntsville, AL (USA). George C. Marshall Space Flight Center). Jan 1982. 109p. NTIS, PC A06/MF A01.

All1349 H alpha flares occurring in 1980 which have known start, maximum brightness, and end times, latitudes, and associated importance and X-ray classes were used to perform a statistical study of flare rise time, decay time, duration, latitude, importance (areal and relative intensity), and X-ray class. Frequency distributions of these parameters are tabulated and plotted.

22141 **(NASA-TM—82474) Sunspot variation and selected associated phenomena: a look at solar cycle 21 and beyond.** Wilson, R.M. (National Aeronautics and Space Administration, Huntsville, AL (USA). George C. Marshall Space Flight Center). Feb 1982. 38p. NTIS, PC A03/MF A01.

REFS.

Solar sunspot cycles 8 through 21 are reviewed. Mean time intervals are calculated for maximum to maximum, minimum to minimum, minimum to maximum, and maximum to minimum phases for cycles 8 through 20 and 8 through 21. Simple cosine functions with a period of 132 years are compared to, and found to be representative of, the variation of smoothed sunspot numbers at solar maximum and minimum. A comparison of cycles 20 and 21 is given, leading to a projection for activity levels during the Spacelab 2 era (tentatively, November 1984). A prediction is made for cycle 22. Major flares are observed to peak several months subsequent to the solar maximum during cycle 21 and to be at minimum level several months after the solar minimum. Additional remarks are given for flares, gradual rise and fall radio events and 2800 MHz radio emission. Certain solar activity parameters, especially as they relate to the near term Spacelab 2 time frame are estimated.

22142 **(NASA-TM—82475) Statistical aspects of the 1980 solar flares. 2: solar cycle activity relationships and additional remarks.** Wilson, R.M. (National Aeronautics and Space Administration, Huntsville, AL (USA). George C. Marshall Space Flight Center). Feb 1982. 55p. NTIS, PC A04/MF A01.

REFS.

Based on 1349 hydrogen alpha flares with X-ray counterparts, an investigation into the relationship between the rise time, decay time, duration, latitude, hydrogen alpha importance, and X-ray class with 2800 MHz radio emission (F2800) was accomplished. An important finding is that during 1980 both the number of hydrogen alpha importance class 1 and number of X-ray class M (and M+X) flares appeared to be rather strongly related to F2800, in a positive sense i.e., number of class 1 and class M events increased as F2800 increased.

22143 **(NASA-TM—83816) Goddard contributions to the workshop on gamma ray transients.** (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center). Aug 1981. 84p. NTIS, PC A05/MF A01.

Six articles addressing cosmic and solar gamma ray transients are presented. The topics covered include: gamma ray lines from solar flares and cosmic transients including burst spectra; a review of the 1979 March 5 transient; time variation in the 511 KeV flux observed by the ISEE spectrometer; time variations of an absorption feature in the spectrum of the burst on 1980 April 19; and the theory of gamma ray amplification through stimulated annihilation radiation.

22144 **(NASA-TM—83840) Accretion disk coronae.** White, N.E.; Holt, S.S. (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center). Oct 1981. 60p. NTIS, PC A04/MF A01.

Submitted for publication.

Recent observations of partial X-ray eclipses from 4U1822-37 have shown that the central X-ray source in this system is diffused by a large Compton-thick accretion disk corona (ADC). Another binary, 4U2129-47, also displays a partial eclipse and contains an ADC. The possible origin of an ADC is discussed and a simple hydrostatic evaporated ADC model is developed which, when applied to 4U1822-37, 4U2129+47 and Cyg X-3, can explain their temporal and spectral properties. The quasi-sinusoidal modulation of all three sources can be reconciled with the partial occultation of the ADC by a bulge at the edge of the accretion disk which is caused by the inflowing material. The height of this bulge is an order of magnitude larger than the hydrostatic disk height and is the result of turbulence in the outer region of the disk. The spectral properties of all three sources can be understood in terms of Compton scattering of the original source spectrum by the ADC. Spectral variations with epoch in Cyg X-3 are probably caused by changes in the optical depth of the corona. A consequence of our model is that any accreting neutron star X-ray source in a semi-detached binary system which is close to its Eddington limit most likely contains an optically thick ADC.

22145 **(NASA-TM—83841) Planetary magnetospheres.** Stern, D.P.; Ness, N.F. (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center). Oct 1981. 45p. NTIS, PC A03/MF A01.

Submitted for publication.

A concise overview is presented of our understanding of planetary magnetospheres (and in particular, of that of the Earth), as of the end of 1981. Emphasis is placed on processes of astrophysical interest, e.g., on particle acceleration, collision-free shocks, particle motion, parallel electric fields, magnetic merging, substorms, and large scale plasma flows. The general morphology and topology of the Earth's magnetosphere are discussed, and important results are given about the magnetospheres of Jupiter, Saturn and Mercury, including those derived from the Voyager 1 and 2 missions and those related to Jupiter's satellite Io. About 160 references are cited, including many reviews from which additional details can be obtained.

22146 **(NASA-TM—83870) Neutral hydrogen in elliptical galaxies with nuclear radio sources and optical emission lines.** Dressel, L.L.; Bania, T.M.; Oconnell, R.W. (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center). Jan 1982. 44p. NTIS, PC A03/MF A01.

An H I detection survey of eleven elliptical galaxies with powerful nuclear radio sources was conducted, using the 305 m antenna of Arecibo Observatory, to test the hypothesis that large H I mass is conductive to the formation of nuclear radio sources in elliptical galaxies. The H I was detected in emission in UGC 09114 and was possibly detected in absorption in UGC 06671. Observations of the remaining galaxies were not sensitive enough to support or refute the hypothesis. Data was combined from other H I surveys and spectroscopic surveys to search for correlations of H I mass with other galactic properties and environmental conditions. Strong correlations of (O II) lambda 3727 emission with H I content and with nuclear radio power were found. The latter two properties may simply indicate, respectively, whether a significant amount of gas is available to be ionized and whether energy is provided by nuclear activity for ionization. No dependence of H I content on optical luminosity or on degree of isolation from other galaxies was found.

22147 (NASA-TM—83873) **Astrophysical tests for radiative decay of neutrinos and fundamental physics implications.** Stecker, F.W.; Brown, R.W. (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center). Dec 1981. 31p. NTIS, PC A03/MF A01.

Submitted for publication.

The radiative lifetime tau for the decay of massious neutrinos was calculated using various physical models for neutrino decay. The results were then related to the astrophysical problem of the detectability of the decay photons from cosmic neutrinos. Conversely, the astrophysical data were used to place lower limits on tau. These limits are all well below predicted values. However, an observed feature at approximately 1700 A in the ultraviolet background radiation at high galactic latitudes may be from the decay of neutrinos with mass approximately 14 eV. This would require a decay rate much larger than the predictions of standard models but could be indicative of a decay rate possible in composite models or other new physics. Thus an important test for substructure in leptons and quarks or other physics beyond the standard electroweak model may have been found.

22148 (NASA-TM—83883) **Experimental and theoretical studies of interstellar grains.** Nuth, J.A. III. (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center). Dec 1981. 260p. NTIS, PC A12/MF A01.

Steady state vibrational populations of SiO and CO in dilute black body radiation fields were calculated as a function of total pressure, kinetic temperature and chemical composition of the gas. Approximate calculations for polyatomic molecules are presented. Vibrational disequilibrium becomes increasingly significant as total pressure and radiation density decrease. Many regions of postulated grain formation are found to be far from thermal equilibrium before the onset of nucleation. Calculations based upon classical nucleation theory or equilibrium thermodynamics are expected to be of dubious value in such regions. Laboratory measurements of the extinction of small iron and magnetite grains were made from 195 nm to 830 nm and found to be consistent with predictions based upon published optical constants. This implies that small iron particles are not responsible for the 220 nm interstellar extinction features. Additional measurements are discussed.

22149 (NASA-TM—83884) **Precise source location of the anomalous 1979 March 5 gamma ray transient.** Cline, T.L.; Desai, U.D.; Teegarden, B.J.; Evans, W.D.; Klebesadel, R.W.; Laros, J.G.; Barat, C.; Hurley, K.; Niel, M.; Vedrenne, G. (National Aeronautics and Space Administration, Huntsville, AL (USA). George C. Marshall Space Flight Center; Los Alamos Scientific Lab., NM (USA); Toulouse-3 Univ., 31 (France). Centre d'Etude Spatiale des Rayonnements). Dec 1981. 16p. NTIS, PC A02/MF A01.

Refinements in the source direction analysis of the observations of the unusual gamma ray transient are presented. The final results from the interplanetary gamma ray burst network produce a 0.1 arc sq. min. error box. It is nested inside the initially determined 2 arc sq min. source region. This smaller source location is within both the optical and X-ray contours of N49 although not positioned at either contour center.

22150 (NASA-TM—83892) **Spectral evolution of active galactic nuclei: a unified description of the x-ray and gamma.** Leiter, D.; Boldt, E. (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center). Feb 1982. 68p. NTIS, PC A04/MF A01.

A model for spectral evolution is presented whereby active galactic nuclei (AGN) of the type observed individually emerge from an earlier stage at z approx. 4 in which they are the thermal X-ray sources responsible for most of the cosmic X-ray background (CXB). The conjecture is pursued that these precursor objects are initially supermassive Schwarzschild black holes with accretion disks radiating near the Eddington luminosity limit. It is noted that after approx. 10 to the 8th power years these central black holes are spun-up to a canonical Kerr equilibrium state (A/M 0.998 Thorne 1974) and shown how they then can lead to spectral evolution involving non-thermal emission extending to gamma rays, at the expense of reduced thermal disk radiation. That major portion of the CXB remaining after the contribution of usual AGN are considered, while a superposition of AGN sources at z 1 can account for the gamma ray background. Extensive X-ray measurements carried out with the HEAO 1 and 2 missions as well as gamma ray and optical data are shown to compare favorably with principal features of this model.

22151 (NASA-TM—83898) **Spectra of cosmic x-ray sources.** Holt, S.S.; Mccray, R. (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center). Feb 1982. 75p. NTIS, PC A04/MF A01.

Submitted for publication.

X-ray measurements provide the most direct probes of astrophysical environments with temperatures exceeding one million K. Progress in experimental research utilizing dispersive techniques (e.g., Bragg and grating spectroscopy) is considerably slower than that in areas utilizing photometric techniques, because of the relative inefficiency of the former for the weak X-ray signals from celestial sources. As a result, the term spectroscopy as applied to X-ray astronomy has traditionally satisfied a much less restrictive definition (in terms of resolving power) than it has in other wavebands. Until quite recently, resolving powers of order unity were perfectly respectable, and still provide (in most cases) the most useful spectroscopic data. In the broadest sense, X-ray photometric measurements are spectroscopic, insofar as they represent samples of the overall electromagnetic continua of celestial objects.

22152 (NASA-TM—83899) **Charged particle motions in the distended magnetospheres of Jupiter and Saturn.** Birmingham, T.J. (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center). Feb 1982. 37p. NTIS, PC A03/MF A01.

Charged particle motion in the guiding center approximation is analyzed for models of the Jovian and Saturnian magnetospheric magnetic fields based on Voyager magnetometer observations. Field lines are traced and exhibit the distention which arises from azimuthally circulating magnetospheric currents. The spatial dependencies of the guiding center bounce period and azimuthal drift rate are investigated for the model fields. Non-dipolar effects in the gradient-curvature drift rate are most important at the equator and affect particles with all mirror latitudes. The effect is a factor of 10-15 for Jupiter with its strong magnetodisc current and 1-2 for Saturn with its more moderate ring current. Limits of adiabaticity, where particle gyroradii become comparable with magnetic scale lengths, are discussed and are shown to occur at quite modest kinetic energies for protons and heavier ions.

22153 (NASA-TM—83901) **Extragalactic gamma radiation: use of galaxy counts as a galactic tracer.** Thompson, D.J.; Fichtel, C.E. (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center). Feb 1982. 13p. NTIS, PC A02/MF A01.

A derivation of the extragalactic diffuse gamma radiation with energies above 35 MeV was carried out using galaxy counts as a tracer of galactic matter. The extragalactic radiation has a differential photon number spectrum which may be expressed as a power law with index 2.35 (+0.4, -0.3) and an intensity above 35 MeV of

(5.5 + or - 1.3) 0.00001 photons sq cm/s/ster, consistent with previous derivations. Use of a 1/sin of the absolute value of b expression of the galactic component produces a poorer fit, suggesting that the high-latitude galactic gamma-ray production may be dominated by cosmic ray interactions with matter rather than by Compton interactions of cosmic rays with photon fields.

22154 **(NASA-TM—83904) Nuclear processes in solar flares.** Ramaty, R. (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center). Mar 1982. 70p. NTIS, PC A04/MF A01.

The theory of solar gamma-ray line production is reviewed and new calculations of line production yields are presented. Observations, carried out with gamma-ray spectrometers on OSO-7, HEAO-1, HEAO-3 and SMM are reviewed and compared with theory. These observations provide direct evidence for nuclear reactions in flares and furnish unique information on particle acceleration and flare mechanisms.

22155 **(NASA-TM—83909) Neutrino masses, neutrino oscillations, and cosmological implications.** Stecker, F.W. (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center). Mar 1982. 63p. NTIS, PC A04/MF A01.

Theoretical concepts and motivations for considering neutrinos having finite masses are discussed and the experimental situation on searches for neutrino masses and oscillations is summarized. The solar neutrino problem, reactor, deep mine and accelerator data, tri-decay experiments and double beta-decay data are considered and cosmological implications and astrophysical data relating to neutrino masses are reviewed. The neutrino oscillation solution to the solar neutrino problem, the missing mass problem in galaxy halos and galaxy cluster galaxy formation and clustering, and radiative neutrino decay and the cosmic ultraviolet background radiation are examined.

22156 **(NASA-TM—83913) On the acceleration of ions by interplanetary shock waves. 1: Single encounter considerations.** Pesses, M.E. (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center). Dec 1981. 37p. NTIS, PC A03/MF A01.

Submitted for publication Sponsored in part by ONR.

The acceleration of energetic ions in interplanetary magnetosonic fast-mode shock waves was studied via analytical modeling and numerical simulations. An analytical model that combines both the shock drift and compressional acceleration mechanisms is presented. The analytical predictions of the model are shown to be in good agreement with numerical simulation results.

22157 **(NASA-TM—83914) On the acceleration of ions by interplanetary shock waves. 3: High time resolution observations of CIR proton events.** Pesses, M.E.; Vanallen, J.A.; Tsurutani, B.T. (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center). Dec 1981. 35p. NTIS, PC A03/MF A01.

Submitted for publication Sponsored in part by ONR.

Observations within + or - 3 hours of corotating interaction region (CIR) shock waves of proton intensities, pitch angle distribution and crude differential energy spectra of the range of 0.6 E sub p 3.4 MeV are presented. The principle result is the evidence for the persistent flow of particles away from the shock. The observations are found to be in good agreement with the hypothesis of local interplanetary shock acceleration by the shock drift and compression mechanisms. The same set of observations strongly suggest that transit time damping does not play an important role in the acceleration of protons to 1 MeV in the immediate vicinity of CIR shocks.

22158 **(NASA-TM—83920) Helium, hydrogen, and oxygen velocities observed on isee-3.** Ogilvie, K.W. (Maryland Univ., College Park); Coplan, M.A. (LASL). (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center). Mar 1982. 21p. NTIS, PC A02/MF A01.

REFS Submitted for publication Sponsored in part by Maryland Univ.

The velocities of hydrogen, helium, and oxygen ions over a full range of solar wind conditions were recorded by the ion composition instrument and Los Alamos National Laboratory plasma instrument aboard the International Sun Earth Explorer. Interspecie velocity differences were observed frequently. For solar wind velocities between 300 and 400 km s(-1) the helium velocity exceeded the hydrogen velocity by 5 km s(-1) the average difference was 14 km s(-1), however no evidence was found for a nonzero average velocity difference between helium and oxygen ions even at the higher velocities. Velocity differences were examined in a number of streams and across a number of interplanetary shocks. Generally helium hydrogen velocity differences are bounded by the Alfven speed. Velocity differences show abrupt changes across interplanetary discontinuities, presumably tangential. The electrostatic potential change across a shock produces differences between the velocities of ions having different charges.

22159 **(PB—82-224304) SMS-GOES solar soft x-ray measurements. Part I: SMS-1, SMS-2 and GOES-1 measurements from July 1, 1974 through December 31, 1976. Technical memo.** Donnelly, R.F. (National Oceanic and Atmospheric Administration, Boulder, CO (USA). Space Environment Lab.). May 1981. 203p. (NOAA-TM-ERL-SEL—56). NTIS, PC A10/MF A01.

Solar soft X ray data are presented in daily graphs from July 1, 1974, through December 31, 1976, during the decay of solar cycle 20. Outstanding solar X-ray bursts are shown in detailed two-hour graphs.

22160 **(PB—82-224312) SMS-GOES solar soft x-ray measurements. Part II: SMS-2, GOES-1, GOES-2 and GOES-3 measurements from January 1, 1977 through December 31, 1980. Technical memo.** Donnelly, R.F.; Bouwer, S.D. (National Oceanic and Atmospheric Administration, Boulder, CO (USA). Space Environment Lab.). May 1981. 207p. (NOAA-TM-ERL-SEL—57). NTIS, PC A10/MF A01.

Solar soft X-ray flux measurements in the 1/2-4A and 1-8A wavelength ranges are presented in daily graphs from January 1, 1977, through August 31, 1978, during the rise of solar cycle 21. Outstanding solar X-ray bursts from the period January 1, 1977, through December 31, 1980, are shown in detailed two-hour graphs.

22161 **(PB—82-225590) The ionization state of the solar wind.** Owocki, S.P. (National Center for Atmospheric Research, Boulder, CO (USA)). 1982. 291p. NTIS, PC A13/MF A01.

The solar wind ionization state is 'frozen' within a few solar radii of the photosphere, and measurements of the ions at 1 a.u. can therefore potentially yield information about conditions at the base of the coronal expansion. If ions are assumed to flow at a steady, common bulk speed in a plasma with a Maxwellian electron distribution, the interplanetary ionization state is characteristic of the electron temperature in the coronal 'freezing-in' region. In this thesis, we examine the effect of relaxing one or more of these assumptions.

22162 **(SLAC-PUB—2997) Finite-particle-number approach to physics.** Noyes, H.P. (Stanford Linear Accelerator Center, CA (USA)). Oct 1982. Contract AC03-76SF00515. 10p. (CONF-820473—2). NTIS, PC A02/MF A01. Order Number DE83007014.

From Symposium on wave particle dualism; Perugia, Italy (22 Apr 1982).

Starting from a discrete, self-generating and self-organizing, recursive model and self-consistent interpretive rules we construct: the scale constants of physics (3,10,137,$1.7\text{x}10^{38}$); 3+1 Minkowski space with a discrete metric and the algebraic bound Δ is an element of Δ tau is greater than or equal to 1; the Einstein-deBroglie relation; algebraic double slit interference; a single-time momentum-space scattering theory connected to laboratory experience; an approximation to wave functions; local phase severance and hence both distant correlations and separability; baryon number, lepton number, charge and helicity; m/sub p//m/sub e/; a cosmology not in disagreement with current observations.

22163 (UCRL—52000-82-12) **Energy and Technology Review.** (Lawrence Livermore National Lab., CA (USA)). Dec 1982. Contract W-7405-ENG-48. 35p. NTIS, PC A02/MF A01. Order Number DE83007216.

Individual abstracts were prepared for the three items in this issue. These include age estimation of the universe, measurement of equations of state for tantalum, and inertial confinement fusion. (GHT)

22164 (UCRL—52000-82-12, pp 1-9) **How old is the universe.** Dec 1982. NTIS, PC A02/MF A01.

In Energy and Technology Review.

A new determination has been made of the age of the universe based upon the use of the rhenium-osmium beta-decay clock. The crucial experimental element in this determination was the measurement of the neutron-capture cross sections for osmium-186 and osmium-187, in the energy range corresponding to stellar temperatures. The use of this clock gives a value for the time elapsed between the formation of the Milky Way and the condensation of the solar system, the period during which the present matter of the solar system was undergoing nucleosynthesis in the interior of stars. Including reasonable assumptions and incorporating appropriate uncertainties, the determination of the age of the universe is 17 +- 3 billion years. This value, although significantly larger than the results of previous determinations, agrees with the age of recently discovered galaxies. It is greater, however, than the apparent limit set by the most recent determination of the Hubble time. This difference has implications of crucial significance for cosmology.

22165 **Preliminary determination of the sun's gravitational quadrupole moment from rotational splitting of global oscillations and its relevance to tests of general relativity.** Hill, H.A.; Bos, R.J.; Goode, P.R. (Department of Physics and Arizona Research Laboratories, University of Arizona, Tucson, Arizona 85721). *Physical Review Letters;* **49**: No. 24, 1794-1797(13 Dec 1982).

The sun's internal angular velocity is estimated from observations of rotational splitting of low-order, low-degree global oscillations detected as fluctuations in the limb-darkening function. The inferred rapid rotation implies a unitless gravitational quadrupole moment, J_2, of (5.5 +- 1.3) x 10^{-6}. When this result is combined with two published planetary radar results values of 0.987 +- 0.006 and 0.991 +- 0.006 are obtained for $(1/3)(2+2\gamma-\beta)$, a quantity equal to one in the general theory of relativity. .ID LRK206 .PG 1798 1798

22166 **Applications of atomic collisions physics to astrophysics.** Dalgarno, A. (Harvard-Smithsonian Center for Astrophysics, Cambridge, MA). pp 1-17 of Physics of electronic and atomic collisions. Datz, S. (ed.). Amsterdam, Netherlands; North-Holland Publishing Co. (1982). Contract AC02-76ER02887.

From 12. international conference on the physics of electronic and atomic collisions; Gatlinburg, TN, USA (15 Jul 1981).

A review is presented of the applications of atomic collision physics to the interpretation of astrophysical phenomena. The cosmological significance of accurate measures of the deuterium and helium abundances is pointed out and the uncertainties which arise from the electronic, atomic and molecular processes entering into the analysis of the observations data are noted. Brief mention is made of some observational consequences of massive neutrinos. Limits on the variability of the fundamental constants obtained from atomic emission and absorption line data are summarized.

22167 **Forum on solar activity.** Paris, France; Observatoire de Paris, Section de Meudon (1981). 129p. (In several languages). .

Observations of solar activity are discussed with emphasis on implications for astrophysics and plasma physics. Solar flares are of prime focus, including spectroscopic diagnostics, structure, and physical mechanisms. The determination of flare related magnetic fields, particle acceleration in flares, and solar radio emission accompanying flares are covered. Solar flare theoretical models and the propagation of collisionless shocks in the interplanetary medium was also treated. For individual titles, see N82-25077 through N82-25085.

22168 **Astrophysical opacities and moment methods in the interpretation of spectral observation in atomic spectra.** Merts, A.L. (Los Alamos Scientific Lab., NM). pp 81-90 of Theory and applications of moment methods in many-fermion systems. Dalton, B.J.; Grimes, S.M.; Vary, J.P.; Williams, S.A. (eds.). New York, NY; Plenum Press (1980).

From Conference on theory and applications of moment methods in many fermion systems; Iowa City, IA, USA (10 Sep 1979).

The calculation of astrophysical opacities involves an understanding of atomic and electronic processes. For the most part these processes are well known. While the fundamentals are well known the practical matter of obtaining cross sections and spectral information is a difficult and time-consuming task. The most important physical processes which need to be considered for opacity calculations are given and details of the method are discussed. (WHK)

6402 Atmospheric Physics

REFER ALSO TO CITATION(S) 21580, 22145

22169 **(AD-A—115512/6) Neutron decay electron injection into the magnetosphere. Master's thesis.** Hanson, B.L. (Air Force Inst. of Tech., Wright-Patterson AFB, OH (USA). School of Engineering). Mar 1982. 83p. (AFIT/GNE/PH—82-8). NTIS, PC A05/MF A01.

A model to determine magnetospheric electron fluxes from bomb neutron decay is presented. The source of electrons was determined from a neutron decay model dependent on a 37 group neutron spectrum of a nuclear detonation. Monte-Carlo simulation of the decay process determined the electron energy and angular spectra as a function of neutron energy. The Air Force Weapons Laboratory's PROMPT code generates neutron spectra from a nuclear detonation at an observer. Using this neutron spectrum and the electron energy and angular distributions from neutron decay theory, an algorithm was developed to calculate the electron flux. An example of a 1 kt burst at 20 km shows that fluxes above normal background can be observed as far away as 400 km. Higher bursts or bursts of larger magnitude will produce higher fluxes at this distance. It is thus concluded that neutron decay alone can generate significant numbers of energetic electrons in the magnetosphere. Their effect may prove to be of tactical significance in medium to high altitude burst scenarios where fission debris is a less significant source of electrons.

22170 **(N—82-18241) Space experiments with particle accelerators.** Obayashi, T. (Tokyo Univ. (Japan)). Nov 1981. 4p. NTIS, PC A08/MF A01.

In NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions 4 p (SEE N82-18234 09-12).

The purpose of space experiments with particle accelerators (SEPAC) is to carry out active and interactive experiments on and in the Earth's ionosphere and magnetosphere. It is also intended to make an initial performance test for an overall program of Spacelab/SEPAC experiments. The instruments to be used are an electron beam accelerator, magnetoplasma dynamic arcjet, and associated diagnostic equipment. The accelerators are installed on the pallet, with monitoring and diagnostic observations being made by the gas plume release, beam-monitor TV, and particle-wave measuring instruments also mounted on the pallet. Command and display systems are installed in the module. Three major classes of investigations to be performed are vehicle charge neutralization, beam plasma physics, and beam atmosphere interactions. The first two are mainly onboard plasma physics experiments to measure the effect of phenomena in the vicinity of Spacelab. The last one is concerned with atmospheric modification and is supported by other Spacelab 1 investigations as well as by ground-based, remote sensing observations.

22171 **(N—82-18243) Atmospheric emission photometric imaging.** Mende, S.B. (Lockheed Missiles and Space Co., Palo Alto, CA (USA)). Nov 1981. 4p. NTIS, PC A08/MF A01.

In NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions 4 p (SEE N82-18234 09-12).

A dual-channel video system mounted on a stabilized two-axis gimbal system (mounted on the pallet) with associated optics and data handling electronics is described. Low light flux observations are required for: (1) investigating ionospheric transport processes by observing Mg+ ions (2) supporting magnetospheric electron bounce experiments (3) measuring electron cross sections for selected atmospheric species (4) detecting small particle contamination and (5) studying natural auroras.

22172 (N—82-26097) Measurement of plasma drifts in planetary magnetospheres. Grard, R.; Haerendel, G.; Melzner, F. (European Space Research and Technology Centre, Noordwijk (Netherlands)). Nov 1981. 8p. NTIS, PC A12/MF A01.

In ESA The Solar System and its Exploration p 97-104 (SEE N82-26087 16-88) REFS.

The GEOS satellites instrumentation is described. Plasma drift velocity and electric field are measured simultaneously and independently. The electric field sensor is an antenna made of two spherical probes separated by a distance of 40 m along a direction perpendicular to the spin axis. The field component measured by the aerial is derived from the difference between the electric potential of the two electrodes. The strength and orientation of the total field vector is computed, assuming that the electric and ambient magnetic fields are perpendicular. Plasma drift is measured, using four electron guns and one electron detector. The drift is evaluated by injecting an artificial beam with a 90 deg pitch angle and measuring its displacement after one or two gyrations.

22173 (NASA-CR—164799) Kinetic response of ionospheric ions to onset of auroral electric fields. Chiu, Y.T. (Aerospace Corp., El Segundo); Kan, J.R. (Alaska Univ., Fairbanks (USA)). Jul 1981. 38p. NTIS, PC A03/MF A01.

Aerospace Corp. REFS.

By examining the exact analytic solution of a kinetic model of collisional interaction of ionospheric ions with atmospheric neutrals in the Bhatnagar-Gross-Krook approximation, we show that the onset of intense auroral electric fields in the topside ionosphere can produce the following kinetic effects: (1) heat the bulk ionospheric ions to approximately 2 eV, thus driving them up to higher altitudes where they can be subjected to collisionless plasma processes (2) produce a non-Maxwellian superthermal tail in the distribution function and (3) cause the ion distribution function to be anisotropic with respect to the magnetic field with the perpendicular average thermal energy exceeding the parallel thermal energy.

22174 (NASA-TM—83923) A broad-band vlf-burst associated with ring-current electrons. Maeda, K. (National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center). Mar 1982. 26p. NTIS, PC A03/MF A01.

Submitted for publication.

Frequency band broadening takes place just outside of the nighttime plasmasphere, where the density of cold plasma is known to be very low during the later phase of a geomagnetic storm. Instead of the gradual broadening of several hours duration, a burst type broadening of VLF emission lasting less than ten minutes was observed by Explorer 45 in a similar location. The magnetic field component of this emission is very weak and the frequency spreads below the local half electron cyclotron frequency. Corresponding enhancement of the anisotropic ring current electrons is also very sudden and limited below the order of 10 keV without significant velocity dispersion, in contrast to the gradual broadening events. The cause of this type of emission band spreading can be attributed to the generation of the quasielectrostatic whistler mode emission of short wavelength by hot bimaxwellian electrons surging into the domain of relatively low density magnetized cold plasma. The lack of energy dispersion in the enhanced electrons indicates that the inner edge of the plasma sheet, the source of these hot electrons, is not far from the location of this event.

6403 Atomic, Molecular, And Chemical Physics

REFER ALSO TO CITATION(S) 21084, 21271, 21273, 21517, 22098, 22099, 22121, 22131, 22166, 22168, 22372, 22564

22175 (AD-A—120349/6) Heavy particle collisions. Spruch, L.; Shakeshaft, R. (New York Univ., NY (USA). Dept. of Physics). 1982. 10p. NTIS, PC A02/MF A01.

This report discusses nuclear resonances and the probability of K-shell ionization, effect of collisions on the emission of radiation, and asymmetric charge transfer.

22176 (ANL/NESC—524) BESFIT; diffraction model elastic scattering cross sections. Pearlstein, S. (Brookhaven National Lab., Upton, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048524.

A maximum of 101 angular points can be used.

BESFIT calculates differential elastic scattering cross sections using a Bessel function expansion, based on a diffraction model. Constant terms may either be supplied as input data or obtained by a least squares fitting of the data.CDC6600; FORTRAN IV; Standard monitor.

22177 (CONF-810705—8) Alternative approach to the surface-excitation model. Krohn, V.E. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 7p. NTIS, PC A02/MF A01. Order Number DE83007870.

From 16. annual conference of the Microbeam Analysis Society; Vail, CO, USA (13 Jul 1981).

Although the development of the surface-excitation model of sputtered-ion emission involved a detailed description of the ionization process, one can arrive at the same result by assuming an equilibrium treatment, e.g. the Saha-Langmuir equation, with the temperature falling as the collision casade develops. This suggests that, even if situations are found where the surface-excitation model is successful, it does not follow that the original detailed description of the ionization process is correct. Nevertheless, the surface-excitation model does contain an interesting new idea which should not be overlooked, i.e. that atoms sputtered during the early stages of a collision cascade will be relatively energetic, and to the extent that the Saha-Langmuir equation has some applicability, will have a probability of positive ionization which will be low for atoms of low ionization potential (I < phi where I is the ionization potential and phi the work function) and high for atoms of high ionization potential (I > phi), relative to lower-energy atoms emitted during the later stages of the collision cascade. The extended abstract will discuss recent experimental results.

22178 (CONF-810728—8) Collisional effects in the passage of fast molecular ions through thin foils. Gemmell, D.S. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 32p. NTIS, PC A03/MF A01. Order Number DE83007937.

From 9. international conference on atomic collisions in solids; Lyon, France (6 Jul 1981).

Some recent developments in studies on the interactions of fast molecular-ion beams with thin foil targets are discussed. 40 references.

22179 (CONF-810868—5) Comparisons between theory and experiment in two-electron systems. Berry, H.G.; DeSerio, R.; Brooks, R.L. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 19p. NTIS, PC A02/MF A01. Order Number DE83007927.

From 6. international conference on fast ion beam spectroscopy; Quebec, Canada (17 Aug 1981).

Recent measurements of the wavelengths of the 1s2s ${}^3S_1$ - 1s2p ${}^3P_{0\ 2}$ transitions in helium-like ions of nuclear charge $Z = 8$ to 26 at several laboratories, including Argonne, Notre Dame, Oxford, Lyon, Berkeley, and Lund are reported. The precision of some of these measurements is sufficient to test the QED contributions to these transition energies to a few parts per thousand.

22180 (CONF-810868—7) Doubly excited states in some light atoms. Berry, H.G.; Brooks, R.L.; Hardis, J.E.; Ray, W.J. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 18p. NTIS, PC A02/MF A01. Order Number DE83007928.

From 6. international conference on fast ion beam spectroscopy; Quebec, Canada (17 Aug 1981).

We have identified a singlet transition in doubly excited helium: $2p^2\ ^1D$ - $2p3d\ ^1D$, at 3298 +- 2A with a full width of 54A or 0.061 +- 0.005 eV. This width is in good agreement with a previous measurement and theory for the width of the $2p^2\ ^1D_2$ state. We have remeasured the decay rate of $1s^22p^2P$ - $1s2p^2\ ^2P$ in Li I and find it is in good agreement with theory. Several transitions in doubly excited Li II have been identified in the 1000A region. No evidence was found for doubly excited quartet transitions in Li I in the vacuum ultraviolet. We present measurements of wavelengths and fine structure of the $1s2s2p^2\ ^5P$ - $1s2p^3\ ^5S$ transitions in C III, N IV and O V.

22181 (CONF-820853—4) VUV spectroscopy of rare gas van der Waals dimers. Dehmer, P.M.; Pratt, S.T. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 68p. NTIS, PC A04/MF A01. Order Number DE83007864.

From NATO conference on photophysics and photochemistry in the vacuum ultraviolet; Lake Geneva, WI, USA (15 Aug 1982).

We have undertaken a systematic study of the photoionization spectra of the homonuclear and heteronuclear rare gas dimers in order to better understand the nature of the bonding in the Rydberg states adnd ions of these molecules. We have obtained results for Ar_2, Kr_2, Xe_2, NeAr, NeKr, NeXe, ArKr, ArXe, and KrXe. Of the remaining dimer species (Ne_2 and the Herare gas dimers), only Ne_2 has been studied using photoionization mass spectrometry. The results of the present series of experiments provide information both on the excited states of the neutral dimers and on the ground and excited states of the dimer ions. Using the data obtained in these measurements, we are able to compile for the first time a nearly complete list of ground state dissociation energies for the homonuclear and heteronuclear rare gas dimer ions. Somewhat less complete results are obtained for the excited states of these species. The observed trends in binding energy provide an excellent example of the systematic changes that occur as a result of changes in atomic orbital energies, polarizability, and internuclear distance, and these trends can be explained qualitatively in terms of simple molecular orbital theory.

22182 (CONF-8106100—6) Molecular-beam, laser-rf, double-resonance studies of calcium monohalide radicals. Childs, W.J.; Cok, D.R.; Goodman, L.S. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 4p. NTIS, PC A02/MF A01. Order Number DE83007690.

From International conference on laser spectroscopy; Alberta, Canada (29 Jun 1981).

The molecular-beam, laser-rf, double-resonance technique has been described a number of times. In essence, the occurrence of a radiofrequency (rf) transition in the electronic ground state of the molecule under study is detected by an increase in the laser-induced fluorescence of the molecular beam when the rf is on resonance. The technique makes it possible to measure small energy splittings (normally spin-rotational or hyperfine) in the electronic ground state of a molecule to an absolute precision of 1 kHz. The sensitivity of the technique is high because even a very small increase in fluorescence can be easily seen if the rf is swept repeatedly and digital data-handling techniques are used. The technique is useful for ionic as well as for neutral atoms and molecules.

22183 (CONF-8204113—1) Cross sections for inelastic scattering of electrons by atoms: selected topics related to electron microscopy. Inokuti, M.; Manson, S.T. (Argonne National Lab., IL (USA); Georgia State Univ., Atlanta (USA). Dept. of Physics and Astronomy). 1982. Contract W-31-109-ENG-38. 74p. NTIS, PC A04/MF A01. Order Number DE83007185.

From Conference on electron beam interactions and solids for microscopy, microanalysis and microlithography; Asilomar, CA, USA (18 Apr 1982).

We begin with a resume of the Bethe theory, which provides a general framework for discussing the inelastic scattering of fast electrons and leads to powerful criteria for judging the reliability of cross-section data. The central notion of the theory is the generalized oscillator strength as a function of both the energy transfer and the momentum transfer, and is the only non-trivial factor in the inelastic-scattering cross section. Although the Bethe theory was initially conceived for free atoms, its basic ideas apply to solids, with suitable generalizations; in this respect, the notion of the dielectric response function is the most fundamental. Topics selected for discussion include the generalized oscillator strengths for the K-shell and L-shell ionization for all atoms with $Z \leqq 30$, evaluated by use of the Hartree-Slater potential. As a function of the energy transfer, the generalized oscillator strength most often shows a non-monotonic structure near the K-shell and L-shell thresholds, which has been interpreted as manifestations of electron-wave propagation through atomic fields. For molecules and solids, there are additional structures due to the scattering of ejected electrons by the fields of other atoms.

22184 (CONF-8205110—3) Dissociation in small molecules. Dehmer, P.M. (Argonne National Lab., IL (USA)). 1982. 6p. NTIS, PC A02/MF A01. Order Number DE83007596.

From Desorption induced by electronic transitions conference; Williamsburg, VA, USA (12 May 1982).

The study of molecular dissociation processes is one of the most interesting areas of modern spectroscopy owing to the challenges presented bt even the simplest of diatomic molecules. This paper reviews the commonly used descriptions of molecular dissociation processes for diatomic molecules, the selection rules for predissociation, and a few of the principles to be remembered when one is forced to speculate about dissociation mechanisms in a new molecule. Some of these points will be illustrated by the example of dissociative ionization in O_2.

22185 (CONF-8206159—1) Generation of beams of refractory-metal clusters. Wexler, S.; Riley, R.J.; Parks, E.K.; Mao, C.R.; Pobo, L.G. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 8p. NTIS, PC A02/MF A01. Order Number DE83007618.

From NATO Advanced Study Institute conference on the impact of cluster physics in materials; Cap d'Agde, France (13 Jun 1982).

Interest in the physical and chemical properties of small metal clusters has recently stimulated the development of sources for the generation of molecular beams of metal clusters, since the collision-free environment of a beam has the advantage of permitting in-flight study of isolated species free of interference from surroundings. For example, spectroscopic studies utilizing tunable lasers may be performed in the molecular beam environment. The objectives of our research program are the elucidation of the physical and chemical properties of clusters of refractory metal atoms, in particular those of the catalytically active transition metals. For these purposes we have built and tested two sources suitable for generation of cluster beams of refractory metals, one for continuous beams and the other for pulsed beams.

22186 (CONF-8209101—2) Outer-shell excitation mechanisms and static-mode laser-fluorescence spectroscopy of sputtered atoms. Gruen, D.M.; Pellin, M.J.; Young, C.E.; Mendelsohn, M.H.; DeWald, A.B. (Argonne National Lab., IL (USA); Georgia Inst. of Tech., Atlanta (USA). Nuclear Engineering Dept.). 1982. Contract W-31-109-ENG-38. 59p. NTIS, PC A04/MF A01. Order Number DE83007657.

From Inelastic ion, surface collision conference; Middlefart, Denmark (21 Sep 1982).

A review of the literature on atoms sputtered in electronically excited states is given together with a discussion of various mechanisms that have been proposed to account for the observations. The major observational features that have emerged from the older studies may be summarized as follows: (1) the kinetic energies of neutral atoms in highly excited electronic states are 1-2 orders of magnitude greater than E/sub b/, the surface binding energy; (2) relative yields show approximately exponential dependence on excitation energy with characteristic temperatures measured in thousands of degrees; (43) absolute yields are lower by 2-3 orders of magnitude than secondary ion yields which themselves are usually very small compared to total sputtering yields. In many cases, excited-state yields increase 1-2 orders of magnitude as a result of surface oxidation. 83 references.

22187 **(CONF-8210128—1) Laser excitation.** Huang, K.N. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 3p. NTIS, PC A02/MF A01. Order Number DE83007821.

From Current trends in atomic spectroscopy workshop; Tucson, AZ, USA (24 Oct 1982).

Topics covered include: effects of parity non-conserving weak neutral interactions in atoms; spectroscopy of exotic atoms; and relativistic many-body dynamic theories. (GHT)

22188 **(DOE/ER/02197—78) Hadronic atoms. Technical progress report, February 1, 1982-January 31, 1983.** Kunselman, R. (Wyoming Univ., Laramie (USA). Dept. of Physics and Astronomy). 1983. Contract AC02-76ER02197. 10p. (COO—2197-78). NTIS, PC A02/MF A01. Order Number DE83003047.

Research at LAMPF, BNL, and TRIUMPF on mesonic atoms is briefly described. X-ray transition studies of pionic chromium isotopes, carbon isotopes, hydrogen, lead 208, bismuth 209, and deuterium are discussed. (WHK)

22189 **(DOE/ER/10431—T1) Interaction of low-energy electrons with surface lattice vibrations. Progress report and future research plans.** Tong, S.Y. (Wisconsin Univ., Milwaukee (USA)). 1983. Contract AC02-79ER10431. 54p. NTIS, PC A04/MF A01. Order Number DE83008079.

The principal focus of the program has been to develop the theory of electron energy losses induced by scattering off vibrational quanta in the regime where the electron is deflected far off the specular direction. Theoretical studies of the lattice dynamics of ordered overlayers of atoms on crystal surfaces have continued. Large-angle energy-loss data have allowed the study of the dispersion relation of a particular surface phonon on the Ni(100) surface, from the center of the two-dimensional Brillouin zone out to the zone boundary in the (110) direction. (GHT)

22190 **(DOE/ER/10893—1) Kinetic studies following state-selective laser excitation. Progress report, March 15, 1981-March 14, 1983.** Keto, J.W. (Texas Univ., Austin (USA)). Sep 1982. Contract AS05-81ER10893. 27p. NTIS, PC A03/MF A01. Order Number DE83007968.

In the past contract period, we initiated studies of excitation transfer reactions from excited states of xenon atoms and excimers produced selectively by two photon laser excitation. Work in the initial period has concentrated on several phases of the program. We have made laser spectrographic studies of pure rare gases to verify our calculated two photon transition rate, to identify the atomic and molecular species of interest, and to determine branching fractions for product states in collisions of excited rare gas atoms with other rare gases. We have continued development of a high repetition rate picosecond laser which operates in the uv. Combined with channel plate photomultipliers we will be able to measure decay times on the order of 20 psec with the precision of the single photon delayed coincidence techniques. We are building a new apparatus featuring a high-pressure flow reactor. The flow reactor will enable us to study energy transfer to molecular reactants. In spectrographic experiments we find that laser excitation when detuned from an atomic resonance can excite atoms during a collision at a particular internuclear separation. We observe that atoms which are excited during a collision react quite differently than atom excited at atomic resonances.

22191 **(DOE/ER/10908—2) Studies of magnetism and exchange scattering in solids using synchroton radiation and spin-polarized photoemission. Progress report, June 1, 1982-May 31, 1983.** Rothberg, G.M. (Stevens Inst. of Tech., Hoboken, NJ (USA)). Jan 1983. Contract AC02-81ER10908. 14p. NTIS, PC A02/MF A01. Order Number DE83007329.

Some of the experiments necessary for proving the existence of Spin Polarized EXAFS (SPEXAFS) and for establishing it as a useful techncique for studying magnetism in solids have been carried out at the Stanford Synchrotron Radiation Laboratory (SSRL) and the National Synchrotron Light Source (NSLS). Transmission EXAFS, which does not depend on electron spin, has been measured in several manganese compounds. The 3s photopeaks of Mn^{2+} in MnF_2 have been shown to display EXAFS-like oscillations. The pin dependence of these oscillations will next be studied. Observations of the 3p photopeaks of iron metal on a palladium substrate have shown anomalous intensity variations with varying photon energy. This phenomenon will also be studied further. The existence of Cooper minima in the iron 3s and 3p photoabsorption cross sections has been sought, and this investigation will continue.

22192 **(DOE/ER/40010—964) Improved Cs^0 source for the production of polarized H^- ions.** Wise, T.; Haeberli, W. (Wisconsin Univ., Madison (USA)). 1982. Contract AC02-81ER40010. 3p. (CONF-820941—13). NTIS, PC A02/MF A01. Order Number DE83007325.

From 5. international symposium on high energy spin physics; Upton, NY, USA (16 Sep 1982).

A recent paper describes the production of a 3 μA D.C. beam of polarized H^- by ionization of polarized H^0 atoms with a 3 particle-mA Cs^0 beam of 40 keV energy. An improved Cs gun is described which yields 10 particle-mA Cs^0.

22193 **(DOE/EV/05784—5) Selective excitation, relaxation, and energy channeling in molecular systems. Progress report, December 1, 1981-November 30, 1982.** Rhodes, W.C. (Florida State Univ., Tallahassee (USA)). 1982. Contract AS05-78EV05784. 9p. NTIS, PC A02/MF A01. Order Number DE83007967.

Topics discussed include the nature of molecular resonances, nonradiative relaxation and quantum beats in the radiative decay dynamics of large molecules, and the case for linear response theory. (WHK)

22194 (LA—9572-C-Vol.1, pp 180-186) **Muonium.** Egan, P.O. (Yale Univ., New Haven, CT). Nov 1982. NTIS, PC A18/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

Recent developments in precision muonium measurements and vacuum muonium experiments are reviewed. Prospects for future improvements in this field at LAMPF II are discussed.

22195 (LA—9572-C-Vol.1, pp 270-281) **Studies of magnetic phase transitions with muons.** Dodds, S.A. (Rice Univ., Houston, TX). Nov 1982. NTIS, PC A18/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

The asymmetric decay of the muon can be used to probe solid state phenomena. As an example, the use of muons to study the phase transition of a disorder magnetic system is discussed. The advantages of the proposed new facilities are shown to be substantial.

22196 **(LA-UR—83-352) Electronic structure and bonding in transuranics: comparison with lanthanides.** Ward, J.W. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 19p. (CONF-830419—1). NTIS, PC A02/MF A01. Order Number DE83007549.

From 16. rare earth research conference; Tallahassee, FL, USA (18 Apr 1983).

The physico-chemical properties of the actinide metals, alloys, and compounds show interesting parallels and contrasts with the rare earths, beyond uranium. At first there is a transition region where the unique bonding properties of the early actinides become less prominent, due to progressive f-electron localization. Nevertheless, in contrast to the rare earths, f-electron energies remain close to the Fermi level, resulting in complex behavior as a function of temperature, pressure and structure. Particularly interesting in this region are the metallic hydrides, whose chemistry is clearly rare-earth like, but whose electronic properties are entirely different. At americium a major localization and f-band narrowing occurs, but the explanation of americium behavior is obscured by the occurrence of the unique f^6 non-magnetic solid-state configuration. Beyond americium, it would appear that real rare-earth-like behavior finally begins; this has been born out by recent studies on the thermodynamics and cohesive energies of curium, berkelium, californium and einsteinium metals. However, a new complication arises almost immediately, in the onset of incipient stabilization of the divalent state, which already appears in californium, whose physico-chemical properties are remarkably similar to samarium. Einsteinium appears to be fully divalent, thus heralding the beginning of a mini-series of truly divalent metals.

22197 (LP—193) Excitation of nitrogen in a luminous discharge. Massabieaux, B. (Paris-11 Univ., 91 - Orsay (France)). Feb 1982. 133p. (French). NTIS, PC A07/MF A01.

REFS.

Temporal relaxation of the excited states of molecular nitrogen, including ionized molecular states, was investigated. A continuous electric discharge in a positive plasma column was studied, using emission spectroscopy. A model of N_2 energy levels in the discharge, based on kinetic theory, is presented. Experimental measurement of electron density, electric field, and gas temperature is described. Results from spectrum analysis of the positive second and negative first line systems give the spatial and vibrational distributions of the population of states. The equations that govern these states, when coupled with the Boltzmann equation, allow a non-Maxwellian solution to the electron energy distribution function.

22198 (MPIS—10/1981) Rainbow scattering of low energy Li ions on W single crystal surfaces, with special regard to the azimuthal dependence. Mann, K.R. (Max-Planck-Institut fuer Stroemungsforschung, Goettingen (Germany, F.R.)). Jun 1981. 118p. (German). NTIS, PC A06/MF A01.

REFS.

In-plane angular distributions and energy loss spectra were taken with the time of flight method. (Angular distributions were also taken during cooling of the crystal after heating up to about 2000 K.) The dependence of the scattering on the azimuthal orientation of the surfaces was studied. A strongly pronounced rainbow structure with minimum two maxima appears in the angular distributions for incidence angles between 10 and 70 deg. Energy loss spectra have no significant azimuthal dependence, contrary to angular distributions. The azimuthal dependence is explained by the crystal surface anisotropy. Trajectory calculations were conducted for quantitative comparison of theory and experiment.

22199 (N—82-24929) A selected ion flow tube investigation on the quenching of N_2 (v not equal to o) by various neutrals. Dobler, W.; Howorka, F.; Lindinger, W. (Innsbruck Univ. (Austria)). 1982. 4p. NTIS, PC A16/MF A01.

In its Symp. on Atomic and Surface Phys., 1982 Contrib. p 295-298 (SEE N82-24880 15-70) REFS Sponsored by Oesterreichischer Fonds zur Foerderung der Wissenschaftlichen Forschung.

A selected ion flow tube (SIFT) was used to determine rate coefficients for the quenching of the vibration of $N_2(+)$ (v not equal to) by Ne, O_2, N_2, NO, and CO_2. Values of 0.045, 1.2, 5, equal to or 0.3, and 1 were obtained. The values are all in units of 0.0000000001 cu cm per 0.1 second.

22200 (N—82-25047) Prediction of molecular infrared band and line intensities. Person, W.B. (Florida Univ., Gainesville (USA)). Apr 1982. 35p. NTIS, PC A18/MF A01.

In NASA. Goddard Space Flight Center Vibrational-Rotational Spectry. for Planetary Atmospheres, Vol. 1 p 89-124 (SEE N82-25043 15-91) REFS.

The general problem of predicting infrared intensities is examined. The problem of predicting line intensities is discussed with attention focussed specifically on the problem of predicting vibrational strengths (or total band intensities). Two methods are considered: predictions based on ab initio quantum mechanical calculations, and predictions based on the transfer of atomic polar tensor parameters from small model molecules to the molecule of interest. Comparisons of predicted spectra with experimental spectra are shown for CH_3OH, CH_3OCH_3, C_2H_5OH, and HOC_2. It is suggested that the most important application of this work may be to the prediction of intensities for free radicals, ions, and reactive intermediates so that the infrared spectrum can be used in the quantitative analysis for these interesting species.

22201 (N—82-25048) New theoretical and experimental methods for pessure broadened linewidths and their interpretation. Gelfand, J.J. (Princeton Univ., NJ (USA)). Apr 1982. 23p. NTIS, PC A18/MF A01.

In NASA. Goddard Space Flight Center Vibrational-Rotational Spectry. for Planetary Atmospheres, Vol. 1 p 125-148 (SEE N82-25043 15-91) REFS.

A review of recent progress in the theory of collisional line broadening, particularly the impact of recent advances in collision dynamics calculations is presented. Some new approaches to the interpretation of experimentally measured linewidths and their impact on planetary atmosphere research are discussed. Experimental techniques which may have some advantage in providing pressure broadening data at very low temperatures are also mentioned.

22202 (N—82-25049) Laboratory molecular spectroscopy. Margolis, J. (Jet Propulsion Lab., Pasadena, CA (USA)). Apr 1982. 21p. NTIS, PC A18/MF A01.

In NASA. Goddard Space Flight Center Vibrational-Rotational Spectry. for Planetary Atmospheres, Vol. 1 p 149-170 (SEE N82-25043 15-91).

The precision required in making spectroscopic measurements is discussed. Remarks are directed specifically to vibration-rotation spectra rather than continuum absorptions. The ultimate precision that is required for line positions is related to the width of the lines which may be no narrower than the Doppler width. The spectroscopic methods considered are those which are of the most general value to the astronomers, those which acquire and can handle large volumes of spectra in digital form, or in a form which is compatible with computer analysis, and in a form which is at least internally consistent. The use of dye laser, grating instruments, and the most versatile instrument for laboratory spectroscopy, the Fourier transform spectrometer is discussed.

22203 (NASA-CR—168999) N_2 pressure - broadened O_3 line widths and strengths near 1129.4 cm-1. Copeland, G.E.; Majorana, L.N.; Harward, C.N.; Steinkamp, R.J. (Old Dominion Univ., Norfolk, VA (USA)). Jun 1982. 30p. NTIS, PC A03/MF A01.

REFS.

A Beer's Law experiment was performed with a tunable diode laser to find the N_2 pressure broadening characteristics of a single 0_3 absorption line at 1129.426 cm for N_2 pressures from 10 to 100 torr (O_3 pressure 3.16 torr). SO_2 line positions were used for wavelength calibration. Line shapes were interatively fitted to a Lorentz function. Results were delta (HWHM in MHz) 47.44 (+ or - 5.34) MHz + 1.730 (+ or - 0.088) MHz/torr *p(torr) with sigma 0.9897. This intercept compares well with the Doppler O_3 - O_3 broadened (at 3.16 torr) width of 44.52 Hz. This result in a HWHM line width of 0.44 cm atm at 760 torr and 285 K. The line strengths integrated over delta nu 0.55 cm were found to be N_2 pressure dependent.

22204 (PB—82-226903) The multiple scattering optical potential for scattering of electrons on he atom. Dymarz, R. (Oxford Univ. (UK). Nuclear Physics Lab.). 1982. 17p. NTIS, PC A02/MF A01.

The optical model potential has been derived from the Glauber multiple scattering series. Using this potential in a wave equation we are able to considerably improve the description of electron scattering on atoms in comparison with the original Glauber model. However our real potential is too weak (it has no 1/r to the 4th power component) to reproduce the scattering at small angles.

22205 Supersonic metal cluster beams of refractory metals: Spectral investigations of ultracold Mo_2. Hopkins, J.B.; Langridge-Smith, P.R.R.; Morse, M.D.; Smalley, R.E. (Rice Quantum Institute and Department of Chemistry, Rice University, Houston, Texas 77251). *Journal of Chemical Physics;* **78**: No. 4, 1627-1637(15 Feb 1983).

A novel technique involving pulsed laser vaporization of the bulk metal within a pulsed supersonic nozzle has been shown to successfully produce ultracold bare metal clusters of even the most refractory of metals, tungsten and molybdenum. Clusters of up to 25 atoms may be readily prepared using this technique. Mass-selective resonant two-photon ionization spectra of Mo_2 produced in this fashion show that the dimer is efficiently cooled in the expansion T/sub trans/<6 K, T/sub rot/~5 K, and T/sub vib/~325 K. We have rotationally resolved the A $^1\Sigma^+$/sub u/←X $^1\Sigma^+$/sub g/ (0—0) band for $^{92}Mo_2$ and determined the bond length in the ground and excited states to be 1.940 +- 0.009 and 1.937 +- 0.008 A, respectively. This confirms and extends the analysis of Efremov et al. [J. Mol. Spectrosc. 73, 40 (1970)] who prepared $^{98}Mo_2$ by flash photolysis of isotopically pure $Mo(CO)_6$. We have also observed the (1—1), (2—2), and (3—3) sequence bands which together with the ground state data of Efremov et al. determine vibrational constants ω/sup prime//sub e/ = 449.0 +- 0.2 cm^{-1} and ω/sub e/x/sup prime//sub e/ = 2.3 +- 0.2 cm^{-1} for the A $^1\Sigma^+$/sub u/ state. The lifetime of the A $^1\Sigma^+$/sub u/ v = 0 state of Mo_2 has been measured to be 18 +- 3 ns by time-delayed two-photon ionization. The ionization potential of Mo_2 is found to be less than 6.42 eV (compared to 7.10 eV for atomic Mo) indicating a substantially stronger chemical bond in $Mo^+{}_2$ than in Mo_2. A discussion of the electronic structure of Mo_2 and the implications of these findings for bonding in other transition metal dimers is also presented.

22206 KVV Auger spectrum of F_2: The importance of hole—hole correlation. Weightman, P.; Thomas, T.D.; Jennison, D.R. (Department of Chemistry, Oregon State University, Corvallis, Oregon 97331). *Journal of Chemical Physics;* **78**: No. 4, 1652-1662(15 Feb 1983).

The KVV Auger spectrum of F_2 has been measured and analyzed in terms of theoretical models of different levels of sophistication. In contrast to the corresponding spectra of many small molecules, this spectrum cannot be described in terms of an independent-particle model. The approach suggested by Thomas and Weightman, which allows in an approximate way for hole—hole interaction, gives noticeably improved results. A more accurate, configuration-interaction treatment developed by Jennison gives reasonable agreement with experiment. Peak assignments based on comparison of this theory with the experimental spectrum have been made. This spectrum provides a very clear case where hole—hole correlation effects are important. The experimental spectrum is unusual in that the lines are generally narrow, in contrast to many KVV spectra, which often have quite broad lines. The ionization potentials for the 2σ/sub g/ and 2σ/sub u/ orbitals have been measured. The relative cross sections for ionization from these orbitals are equal, suggesting that those orbitals arise almost entirely from fluorine 2s atomic orbitals, with little admixture from 2p.

22207 Vibrational-rotational energy transfer in collisions of HF (v = 4, J = 20) with rare gases. Thompson, D.L. (University of California, Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Journal of Chemical Physics;* **78**: No. 4, 1763-1766(15 Feb 1983).

State-to-state energy transfer cross sections for He and Ne+HF(v = 4, J = 20) at 0.2 eV initial relative translational energy were computed using quasiclassical trajectories. These results are compared with previously published results for Ar+HF at the same initial conditions. The results show that the number of final J states populated in a given final v state increases and that the magnitudes of the state-to-state cross sections decreases as the size of the rare gas atom decreases. The cross sections for vibrational transitions are not sensitive to the size of the rare gas atom.

22208 Application of the semiclassical perturbation (SCP) approximation to diffraction and rotationally inelastic scattering of atoms and molecules from surfaces. Hubbard, L.M.; Miller, W.H. (Department of Chemistry and Materials and Molecular Research Division, Lawrence Berkeley Laboratory, University of California, Berkeley, California 94720). *Journal of Chemical Physics;* **78**: No. 4, 1801-1807(15 Feb 1983).

The semiclassical perturbation (SCP) approximation of Miller and Smith [Phys. Rev. A 17, 17 (1978)] is applied to the scattering of atoms and molecules from crystal surfaces. Specifically, diffraction of He from LiF, and diffraction and rotationally inelastic scattering of H_2 from LiF are treated, and the SCP model is seen to agree well with earlier coupled-channel and quantum sudden calculations. These tests of the SCP model are all for "soft" interaction potentials, e.g., of the Lennard-Jones Devonshire variety, but it is also shown that the model behaves correctly in the limit of an impulsive hard-wall potential function. The SCP picture thus appears to have a wide range of validity for describing the dynamics of gas-surface collisions.

22209 Semiclassical vibrational spectra for diatomic molecules: Application to HF, CO, and NO. Stine, J.R.; Noid, D.W. (Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Journal of Chemical Physics;* **78**: No. 4, 1876-1883(15 Feb 1983).

Semiclassical dipole-moment matrix elements are calculated for HF, CO, and NO using realistic dipole-moment functions, and are in excellent agreement with those calculated from quantum mechanics. The first two cases have the Δn = 1 vibrational transition exhibiting a maximum at excited vibrational states and then becoming nearly forbidden at higher vibrational states; in this region, the Δn = 2 transition becomes more probable than the Δn = 1 transition. This behavior is also expected for NO or for any heteronuclear diatomic molecule whose dipole moment has a maximum at an internuclear distance greater than r/sub e/.

22210 Theoretical hyperfine structure of the muonic ^3He and ^4He atoms. Huang, K.; Hughes, V.W. (Argonne National Laboratory, Argonne, Illinois 60439). *Physical Review [Section] A: General Physics;* **26**: No. 5, 2330-2333(Nov 1982). Contract W-31-109-ENG-38.

The hyperfine structures of the muonic ^3He atom ($^3He\mu^-e^-$) and the muonic ^4He atom ($^4He\mu^-e^-$) are calculated with the use of variational wave functions. Relativistic and radiative corrections are included. The theoretical hyperfine structure interval is Δν = 4166.8 +- 0.3 MHz for the muonic ^3He atom, and Δν = 4465.0 +- 0.3 MHz for the muonic ^4He atom; these values are in good agreement with the experimental values.

22211 Energy and angle correlations of low energy backscattered light atoms. Oen, O.S.; Robinson, M.T. (Oak Ridge National Lab., TN (USA). Solid State Div.). *Journal of Nuclear Materials;* **111**: 789-794(Nov-Dec 1982). Contract W-7405-ENG-26.

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN, USA (3 - 7 May 1982).

The correlation between the emergent energy and angle of H and He atoms that are reflected from solid surfaces has been studied using the computer program MARLOWE. Both polycrystalline and amorphous targets of Al and W have been investigated using normally incident atoms of initial energies from 0.1 to 0.5 keV. The results show that particles reflected with high energy have an angular distribution that is between cosine and isotropic. In contrast, the medium and low energy particles have a distribution that is over-cosine, that is an excess of particles emerge at angles near the surface normal. No essential differences in the shape of the angular distributions were found between the polycrystalline and amorphous targets.

22212 Electron capture in low-energy collisions of C/sup q/+ and O/sup q/+ with H and H_2. Phaneuf, R.A.; Alvarez, I.; Meyer, F.W.; Crandall, D.H. (Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Physical Review [Section] A: General Physics;* **26**: No. 4, 1892-1906(Oct 1982).

Total electron-capture cross-section measurements are reported for C/sup q/+ (3< or =q< or =6) and O/sup q/+ (2< or =q< or =6) ions colliding with hydrogen atoms and molecules in the energy range (0.01< or =E< or =10) keV/amu. The cross sections range from (0.5—7) x 10^{-15} cm^2, and neither obey simple charge-scaling rules, nor exhibit uniform dependences on collision velocity in this energy range. For a given charge q, cross sections for the less-highly-stripped oxygen ions exceed those for carbon ions at energies below a few-hundred eV/amu. Comparison is made between these measurements and theoretical calculations which have heretofore remained untested at low collision energies. In general, the agreement is good for those systems where detailed perturbed-stationary-state theory is available, but is best with those calculations in which the collision dynamics as well as the molecular couplings are treated quantum mechanically. Generalized theories which work well for collision systems containing many bound electrons, do not give accurate representations of these few-electron systems at low energies.

22213 **Photoelectron angular distributions from electron-atom collisions.** White, M.G. (Department of Chemistry, Brookhaven National Laboratory, Upton, New York 11973). *Physical Review* [*Section*] *A: General Physics;* **26**: No. 4, 1907-1914(Oct 1982).

The differential cross section for electron-impact ionization of atoms has been derived for the general case and the dipole (E1) limit of the Born approximation. Emphasis was placed on the theoretical description of the (e,2e) angular correlation between fast electrons scattered in the forward direction and electrons ejected by the ionization process. The general angular-momentum treatment of this work results in a more complete description of the dipole (e,2e) angular distribution than previous purely kinematic analyses.

22214 **Spin-orbit interval in the ground state of F-like ions.** Kim, Y.; Huang, K. (Argonne National Laboratory, Argonne, Illinois 60439). *Physical Review* [*Section*] *A: General Physics;* **26**: No. 4, 1984-1987(Oct 1982). Contract W-31-109-ENG-38.

Recommended spin-orbit intervals in the ground state, $^2p^5$ ^{2}P/sub 3/2/-^{2}P/sub 1/2/, of fluorinelike ions are presented for ions of high nuclear charge (Z< or =56). The recommended values are based on the relativistic Hartree-Fock calculations with corrections deduced from known experimental values in the low-Z side of the sequence.

22215 **Ionization and recombination coefficients for Fe XV—Fe XIX.** Isler, R.C.; Crume, E.C.; Arnurius, D.E. (Fusion Energy Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Physical Review* [*Section*] *A: General Physics;* **26**: No. 4, 2105-2116(Oct 1982).

During neutral-beam-heated, counter-injection discharges in the ISX-B tokamak, impurities tend to collect in the interior of the plasmas. In these circumstances iron ions preferentially accumulate with long confinement times in regions of almost constant electron temperature. The concentrations of intermediate stages of iron (Fe XV, XVI, XVIII, and XIX) have been studied under these conditions to investigate the ratios of recombination and ionization coefficients. The dielectronic recombination coefficients are then deduced by assuming that the ionization and the radiative and charge-exchange recombination rates can be calculated closely from theory.

22216 **Angular distribution and spin polarization of Auger electrons following photoionization and photoexcitation.** Huang, K. (Argonne National Laboratory, Argonne, Illinois 60439). *Physical Review* [*Section*] *A: General Physics;* **26**: No. 4, 2274-2276(Oct 1982). Contract W-31-109-ENG-38.

Angular distribution and spin polarization of Auger electrons following photoionization and photoexcitation are presented in concise parametrized expressions. The striking similarity with corresponding expressions for photoelectrons enables one to apply kinematic properties known for photoelectrons in analyzing Auger electrons.

22217 **Charge distributions of barium isotopes from muonic X-rays.** Shera, E.B.; Wohlfahrt, H.D.; Hoehn, M.V. (Los Alamos National Lab., NM (USA)); Tanaka, Y. (Purdue Univ., Lafayette, IN (USA)). *Physics Letters,* [*Section*] *B;* **112**: No. 2, 124-128(6 May 1982).

The results of a muonic X-ray study of the charge radii of stable barium isotopes are presented and compared with optical isotope shifts. The isotope shifts $\Delta <r^2>$ of a wide range of barium isotopes are found to be in good agreement with the droplet model and with IBA calculations.

22218 **Stochastic calculation of interaction energies.** Alder, B.J. (Lawrence Livermore National Lab., CA); Ceperley, D.M.; Reynolds, P.J. *Journal of Physical Chemistry;* **86**: No. 7, 1200-1204(1982). Contract W-7405-ENG-48.

A Monte Carlo method by which the properties of a collection of interacting nuclei and electrons might be accurately calculated is briefly outlined. This method allows quantitative determination of the pairwise intermolecular potential and potential surfaces but eliminates the use of these constructs for dense systems. Preliminary results on the electron gas, hydrogen solid, and the molecules He_2, LiH, Li_2, and H_2O are at least as accurate as the best previous work.

22219 **Tunable far-infrared radiation from optically pumped potassium Rydberg transitions.** Bookless, W.A. (Lawrence Livermore National Lab., CA); Hrubesh, L.W.; Stevens, C.G.; Rinehart, E.A. *International Journal of Infrared and Millimeter Waves;* **3**: No. 2, 171-187(1982). Contract W-7405-ENG-48.

The generation of tunable far-infrared radiation by the optical pumping of potassium metal vapor to the 13p Rydberg state is reported. Subsequent cascade by stimulated emission is measured at several wavelengths between 76 and 146 cm^{-1} with a conversion quantum efficiency of greater than 10%. Emission observed in this region are tuned up to 18 GHz by the application of a pulsed Stark field across a parallel-plate heat pipe. Cascade branching to the 11 d to 10 f transition at 146 cm^{-1} is observed which can be tuned up to 7 cm^{-1} in the device. Similar branching following excitation up to the 18 p state is shown to provide almost complete tunability in the far-infrared region.

22220 **Monte-Carlo calculations of two- and three-body ionic recombination.** Whitten, B.L. (Rice Univ., Houston, TX); Morgan, W.L.; Bardsley, J.N. *Journal of Physics B: Atomic and Molecular Physics;* **15**: 319-326(1982). Contract W-7405-ENG-48.

The recombination of positive and negative ions in a dense ambient gas is studied using classical Monte-Carlo trajectories. The models used represent Kr^+-F^- in Ar and (Na^+,K^+)-Cl^- in flames with mixtures of H_2, N_2, and O_2 at temperatures between 1800 and 2400°K. The relative importance of two-body and three-body processes, and the branching ratio for the production of neutral atoms or molecules are explored.

22221 **Computer simulations of low-energy neon-ion scattering from nickel crystals.** Helbig, H.F. (Clarkson Coll. of Tech., Potsdam, NY); Linder, M.W.; Morris, G.A.; Steward, S.A. *Surface Science;* **114**: 251-271(1982). Contract W-7405-ENG-48.

The model of successive single binary elastic collisions used by a computer code called ARGUS is sufficiently accurate to reproduce the salient features of energy spectra that result from ion-surface scattering for the neon on nickel system down to incidence energies of 600 eV. Agreement with experimental measurements is at least as good as that obtained by more detailed calculations, which include the interactions of many particles. Many features of the backscattered energy spectra can be associated with a single, or at most a few, specific collision sequences. ARGUS selects sampling areas that are orthogonal to the incident beam direction rather than parallel to the surface. These sampling areas are constructed from polygons formed by the intersection of the Wigner-Seitz cell of an atom with a plane perpendicular to the ion beam direction and passing through the center of the atom. These polygons of surface atoms form an overlapping mosaic. The irreducible portion of this mosaic (a type of primitive cell) that is visible along the ion beam direction is the required sampling area. This approach provides the most economical sampling of the surface.

22222 **Electric dipole transitions in C/sub L/-like ions.** Vajed-Samii, M.; MacDonald, K. (Department of Physics, The Johns Hopkins University, Baltimore, Maryland 21218). *Atomic Data and Nuclear Data Tables;* **26**: No. 5, 467-475(Sep 1981).

Theoretical transition energies, wavelengths, and oscillator strengths for E1 transitions from the low-lying J = 1/2, J = 3/2, and J = 5/2 excited states to the J = 1/2 and J = 3/2 ground states are presented for ten ions isoelectronic with the chlorine atom. The multiconfiguration Dirac—fock technique is used to generate the wave functions and obtain the energy levels. The effect of some correlation with 3d orbitals is noted. The relativistic forms of the electric-dipole operator are used to obtain values of oscillator strength corresponding to the nonrelativistic length and velocity forms.

22223 **Effect of multiple scattering on the intensity of depolarized light.** Weis, J.J. (Universite Paris-Sud, Orsay, France); Alder, B.J. *Chemical Physics Letters;* **81**: No. 1, 113-114(1 Jul 1981). Contract W-7405-ENG-48.

The effect of the higher-order scattering terms on the depolarized light intensity for the inert gases at liquid densities is shown to be negligible by iterating the molecular dynamics calculation.

22224 **Angular distribution of Pb L x-rays excited by 3 MeV protons.** Clark, M. (Univ. of North Carolina, Chapel Hill); Hurst, S.; Shafroth, S.M.; Swenson, J.; Willis, J.E.; Varghese, S.L. *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1117-1118(Apr 1981).

The angular distribution of Pb L1 and L $_{\infty}$ x-rays has been measured in the case of lead where the targets were typically 100 μg/cm^2 thick with a 400 μg/cm^2 layer of silver evaporated on each side. Spectra were obtained at 25, 45, 65, 90, 115, 135 and 155° and ratios of Pb L x-rays to the isotropic Ag K x-rays were taken. The most readily interpretable case is L1 since this transition involves only the Lm subshell. After correcting for x-ray absorption in the target assuming it to be layered (i.e., neglecting diffusion of the Ag in the Pb) a small deviation from isotropy is found which is expected due to enhanced depopulation of M = 0 substates at small impact parameter collisions. The velocity dependence of the alignment parameter A_2 has been calculated using PWBA and screened as well as unscreened wave functions. The results for agree with these calculations. Further work is under consideration.

22225 **Relative population of the levels of the 1s2s2p and 1s2p^2 configurations of argon from three electron excited atoms.** Tunnell, T.W.; Bhalla, C.P. (Kansas State Univ., Manhattan). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1081-1083(Apr 1981).

The possible contributions of the cascading from higher excited states to the states which can deexcite by the x-ray and Auger processes are investigated for Li-like argon. A model is developed to calculate the probability that a given excited state will eventually populate a particular lower excited state. The model requires the calculation of the transition rates of the cascading levels. Numerical results are presented for the cascade feeding of the levels of the 1s2s2p and 1s2p^2 configurations. The cascading levels considered belong to the 1s2snl and 1s2pnl configurations with nl = 3s,3p,...4f.

22226 **Simulated Lyman-alpha and dielectronic satellite spectra, Z = 6-20.** Seely, J.F. (Optical Sciences Division, Naval Research Laboratory, Washington, DC 20375). *Atomic Data and Nuclear Data Tables;* **26**: No. 2, 137-166(Mar 1981).

The dielectronic satellite transitions originating on the 2/2l' and 2/3l' doubly excited levels of the He-like ions with Z = 6-20 are tabulated in a useful format. The relative intensities of the satellite transitions are listed for the two cases of low electron density (corona equilibrium) and high electron density (Saha equilibrium). This compilation of wavelengths and relative intensities should facilitate the indentification of dielectronic satellite lines in the x-ray spectra of hot plasmas. The Lyman-α and satellite intensity distributions are stimulated by convolving the calculated intensities with Gaussian profiles. These calculated spectra illustrate the blending of the satellite lines and indicate the instrumental resolution necessary to resolve the satellite features in experimental data. Also included is a bibliography of published experimental spectra for the satellites of the Lyman-α line of moderate-Z ions in dense laboratory plasmas.

22227 **Branching ratios and photoelectron angular distributions through the Hopfield bands in N_2 between 650 and 730 A.** West, J.B. (Univ. of Maryland, College Park); Codling, K.; Parr, A.C.; Ederer, D.L.; Cole, B.E.; Stockbauer, R.; Dehmer, J.L. *Journal of Physics B: Atomic and Molecular Physics;* **14**: 1791-1801(1981).

Vibrationally and angularly resolved photoelectron spectra have been recorded in the wavelength range 650 to 730 A for N_2, in the region of the autoionizing resonances leading to the B $^2\Sigma$/sub u/$^+$ state of the N_2^+ ion. The influence of these resonances on both the partial cross sections to the A ^{2}PI/sub u/ state and the X $^2\Sigma$/sub g/$^+$ state (the branching ratios) and the angular distribution of the photoemitted electrons is clearly demonstrated.

22228 **Self-focusing in SF_6.** Ackerhalt, J.R.; Galbraith, H.W. (Los Alamos National Lab., NM). *Proceedings of the Society of Photo-Optical Instrumentation Engineers;* **288**: 223-228(1981).

It is shown by explicit calculation of the previously published quasicontinuum model that the molecular susceptibility rapidly approaches zero as higher excited states of the molecule become populated. Hence the overtones of the nu$_3$-pumped mode are totally responsible for the self focusing effects in SF_6. The nu$_3$ ladder contribution to the susceptibility is calculated. The vibrational model is a classical triply degenerate anharmonic oscillator in the Cartesian basis with the anharmonicity parameters chosen to be consistent with the latest spectroscopic anlaysis of the 3nu$_3$ overtone spectrum. The rotational structure is represented by a distribution of these oscillators where the distribution is chosen to correspond to the spectrum of the nu$_3$ fundamental. Good agreement is found with the 300K self-focusing data of Nowak and Ham at CO_2 P(28), P(20) and P(10) in SF_6.

22229 **Moment techniques in atomic and molecular scattering theory.** Reinhardt, W.P. (Univ. of Colorado, Boulder). pp 129-150 of Theory and applications of moment methods in many-fermion systems. Dalton, B.J.; Grimes, S.M.; Vary, J.P.; Williams, S.A. (eds.). New York, NY; Plenum Press (1980).

From Conference on theory and applications of moment methods in many fermion systems; Iowa City, IA, USA (10 Sep 1979).

Moment techniques have recently been shown to be useful in ab initio calculation of atomic and molecular continuum processes. We illustrate these methods in a discussion of the photoeffect in hydrogen (H) and H$^-$, and in a discussion of e$^+$-H scattering. As further illustrations of the utility of moments in non-relativistic scattering we consider their use in extracting information from classical trajectory treatments of molecular collisions, and their phenomenological application in correlating experimental data via the information theory approach of Bernstein and Levine.

22230 **Stieltjes-Tchebycheff moment-theory approach to photoeffect studies in Hilbert space.** Langhoff, P.W. (Indiana Univ., Bloomington). pp 191-212 of Theory and applications of moment methods in many-fermion systems. Dalton, B.J.; Grimes, S.M.; Vary, J.P.; Williams, S.A. (eds.). New York, NY; Plenum Press (1980).

From Conference on theory and applications of moment methods in many fermion systems; Iowa City, IA, USA (10 Sep 1979).

An outline is given of the so-called Stieltjes-Tchebycheff method for studies of photo cross sections in Hilbert space. This approach, based on recognition of the convergence of spectral moments of the cross section in an L^2 basis, has proved particularly useful in studies of molecular photo-effect, in which case the potentials are noncentral and nonlocal, and electronic wavefunction antisymmetry under permutation must be maintained. Moreover, moment-theory strategy has been adopted recently in nuclear photoeffect studies, and so a description of the Stieltjes-Tchebycheff formalism and related techniques seems appropriate at this time. The general theoretical development is presented. Illustrative applications, including photodissociation of the deutron, photoabsorption in atomic hydrogen and helium, and photodetachment in the hydrogen anion, are given. Polynomial-expansion and continued-fraction summation techniques for obtaining photo cross sections from Hilbert-space calculations are described and are contrasted and compared with the Stieltjes-Tchebycheff approach. (WHK)

22231 **Extended x-ray absorption fine structure (EXAFS): a novel probe for local structure of glassy solids.** Wong, J. (General Electric Corporate Research and Development, Schenectady, NY). *Proceedings of the Society of Photo-Optical Instrumentation Engineers;* **204**: 44-52(1979). Contract AC02-79ER10382.

The extended x-ray absorption fine structure (EXAFS) is the oscillation in the absorption coefficient extending a few hundred eVs on the high energy side of an x-ray absorption edge. This mode of spectroscopy has recently been realized to be a powerful tool in probing the local atomic structure of all states of matter, particularly with the advent of intense synchrotron radiation. More importantly is the unique ability of EXAFS to probe the structure and dynamics around individual atomic species in a multi-atomic system. In this paper, the physical processes associated with the EXAFS phenomenon will be discussed. Experimental results obtained at the Stanford Synchrotron Radiation Laboratory on some oxide and metallic glasses will be presented. The local structure in these materials are elucidated using a Fourier transform technique.

6404 Fluid Physics

REFER ALSO TO CITATION(S) 22566, 22570

22232 **(AD-A—118074/4) A variational approach to the Rayleigh-Taylor instability of an accelerating plasma slab. Master's thesis.** Targove, J.D. (Air Force Inst. of Tech., Wright-Patterson AFB, OH (USA). School of Engineering). Dec 1981. 81p. NTIS, PC A05/MF A01.

The growth rate of the hydromagnetic Rayleigh-Taylor instability is approximated here for an accelerating plasma slab. The slab is chosen as a large-radius approximation to an imploding cylindrical foil. A normal mode solution of the MHD equations is assumed, resulting in an integral relation for the instability growth rate. The Rayleigh-Ritz variational method is applied to the relation to estimate the growth rate. A linearly decreasing magnetic field is assumed in the slab perpendicular to the acceleration. A corresponding equilibrium mass density profile is then found. Growth rate estimates are then made for these profiles. Calculations are made for perturbation wavevectors perpendicular to the acceleration and at an angle theta to the magnetic field. The growth rates for theta = 90 degrees compare favorably with LeLevier et al's results for a continuous density transition (14). Growth rates for theta = 0 degrees are stable for all perturbation wavelengths and magnetic field strengths. This contradicts prior results in both slab and cylindrical geometry and suggests an error in this work.

22233 **(SFB—80/T/211) Calculation of curved shear layers with two-equation turbulence models.** Rodi, W.; Scheuerer, G. (Karlsruhe Univ. (T.H.) (Germany, F.R.). Sonderforschungsbereich Ausbreitungs- und Transportvorgaenge in Stroemungen). Jul 1982. 48p. NTIS (US Sales Only), PC A04/MF A01. Order Number DE83750303.

With 32 refs., 14 figs.

Three extensions of the k-epsilon turbulence model were tested for shear-layer flows with streamline curvature. The first version is an algebraic stress model which was derived by simplification of modelled Reynolds stress equations and does not contain curvature-specific empiricism. The other two versions use modified form of the dissipation rate equation. The test cases considered are a convexly curved boundary layer, a curved mixing layer and wall jets on logarithmic spiral surfaces. The results show that the algebraic stress model gives the best overall agreement in the curved part of the flow but predicts too fast a recovery after the removal of curvature.

22234 **(UCRL—88560) Particle-dynamics calculations of shear flow.** Walton, O.R. (Lawrence Livermore National Lab., CA (USA)). Aug 1982. Contract W-7405-ENG-48. 13p. (CONF-820843—3). NTIS, PC A02/MF A01. Order Number DE83005446.

From US-Japan seminar on new models and constitutive relations in the mechanics of granular materials; Ithaca, NY, USA (22 Aug 1982).

Two-dimensional discrete particle computer models similar to those of P. Cundall are described. The soft-particle approach used in these models allows them to be applied over a wide range of conditions from static situations through rapid shear conditions. Surface friction between particles and with boundary walls is explicitly modeled. Particular attention is paid to the modeling of dynamic situations wherein the energy losses and momentum transfer during inter-particulate collisions play important roles. Comparisons with analytic solutions have verified the numerical techniques and direct comparison with physical tests involving several particles have verified the models' ability to calculate the motion of real materials. Direct shear tests on oil shale rubble and corresponding calculations indicate qualitatively similar circulation phenomena and both showed large fluctuations in the magnitude of the shearing force. Incline chute flow calculations are providing detailed descriptions of individual particle paths in which shearing and size segregation phenomena can be observed. Initial comparisons with experiments indicate somewhat slower segregation in two-dimensional calculations than in experiments with spherical particles. 5 figures.

22235 **Dielectric effects on the spectra of condensed phases.** Warner, J.W.; Wolfsberg, M. (Chemistry Department, University of California, Irvine, California 92717). *Journal of Chemical Physics;* **78**: No. 4, 1722-1730(15 Feb 1983).

The single-resonance damped oscillator model for molecular polarizability is combined with the Lorentz model for the local field in order to obtain expressions describing the dielectric constant and absorption coefficient of pure condensed phases. These expressions are functions of three parameters: the transition dipole matrix element, the molecular resonance frequency, and the lifetime. It is found that condensed phases exhibit a macroscopic resonance frequency different from the molecular resonance frequency, and equations are supplied whereby one may calculate this shift. The shape of the condensed phase absorption coefficient is found to be unsymmetrical about the resonance frequency for intense bands; a method is described in which one exploits this lack of symmetry in order to find the transition dipole matrix element. Attenuated total reflection data for four liquid phase infrared bands are analyzed in terms of the absorption model.

22236 **Rayleigh—Taylor instability with spatially varying acceleration: an illustration.** Baker, L. (Mission Research Corporation, Albuquerque, New Mexico 87106). *Physics of Fluids;* **26**: No. 2, 391-392(Feb 1983). Contract AC04-76DP00789.

An illustrative but realistic case of Taylor instability in an atmosphere in which the density increases exponentially with height and the gravitational acceleration varies with height, $g(z) = g_1 + g_2$ exp(+- k/sub g/z), is considered. This model problem is of interest both in astrophysical contexts (e.g., an extended accretion disk) and magnetically accelerated configurations in which the field may diffuse into the material being accelerated. Both bounded and unbounded atmospheres are considered. For the case $g = g_0$ exp(-k/sub g/z), the growth rate is reduced compared to the case with constant $g = g_1 = g_0$ exp(-k/sub g/z/sub m/), where z/sub m/ is the height of the maximum of the velocity eigenfunction, by more than would be expected.

22237 **Two models of truncated Navier—Stokes equations on a two-dimensional torus.** Franceschini, V. (Los Alamos National Laboratory, Center for Nonlinear Studies, MS 258, Los Alamos, New Mexico 87545). *Physics of Fluids;* **26**: No. 2, 433-447(Feb 1983).

Two truncations of the Navier—Stokes equations for an incompressible fluid on a two-dimensional torus are numerically investigated. The two models, an eight-mode truncation and a nine-mode extension of it, exhibit almost completely different behaviors. Only two aspects appear to be common to both. First, in contrast to all the previously studied models, turbulence takes place at low Reynolds numbers and for critical values close to each other. Second, there is a parameter interval for which the same stable periodic orbit is present in both models. The main feature of the two truncations is a very rich phenomenology, with many different bifurcations of closed orbits. Turbulence is reached through a sequence of period-doubling bifurcations in the eight-mode model, and via a tangent bifurcation in the nine-mode one. Sequences of infinite bifurcations, the presence in a very narrow range of a stable closed orbit with a quite long period, a homoclinic bifurcation, and the coexistence of strange attractors with attracting periodic orbits, appear to be the more interesting phenomena.

22238 Effect of compressibility on the Rayleigh—Taylor instability. Bernstein, I.B.; Book, D.L. (Berkeley Research Associates, Springfield, Virginia 22150). *Physics of Fluids;* **26**: No. 2, 453-458(Feb 1983).

Eigenfrequencies are calculated for infinitesimal perturbations of the system consisting of two semi-infinite regions, each filled with a constant-temperature ideal polytrope stratified exponentially against gravity. The linear growth rate for the Rayleigh—Taylor instability which occurs when the density above the interface exceeds that below it is shown in the model to vary linearly with wavenumber k as k→0. The incompressible fluid result is obtained when the adiabatic index γ approaches ∞. For finite γ (i.e., compressible fluids), the growth rates are in general larger than in the incompressible case. Numerical results and limiting cases are described which illustrate this conclusion.

22239 Exact solutions to the renormalization-group fixed-point functions for intermittency in two-dimensional maps. Hu, B.; Rudnick, J. (Department of Physics, Brookhaven National Laboratory, Upton, New York 11973). *Physical Review [Section] A: General Physics;* **26**: No. 5, 3035-3036(Nov 1982). Contract AC02-76CH00016.

Using a differential-equation formulation, we have found the exact solutions to the fixed-point functions of the renormalization-group equations for intermittency based on a class of two-dimensional area-preserving maps.

22240 Rayleigh-Taylor instabilities in stratified fluids. Mikaelian, K.O. (University of California, Lawrence Livermore National Laboratory, Livermore, California 94550). *Physical Review [Section] A: General Physics;* **26**: No. 4, 2140-2158(Oct 1982). Contract W-7405-ENG-48.

We study the growth of Rayleigh-Taylor instabilities at the interfaces of any number N of stratified fluids forming an arbitrary density profile. Using the linear theory, we show that there are 2(N-1) exponential growth rates which can be found by calculating the eigenvalues of an (N-1) x (N-1) band matrix. We illustrate analytically the case N = 3. For general N we state and outline the proofs of two theorems: the first refers to the invariance of the spectrum of growth modes under inversion (rho/sub i/→1/rho/sub N+1-i/, t/sub i/→t/sub N+1-i/), and the second relates the spectrum of any inversion-invariant density profile having free boundaries to the spectrum of the same profile between fixed boundaries. We compare and illustrate the results of our numerical code with the case of a continuous density profile rho = rho$_0$e/sup betay/, and, setting N = 12, we apply our technique to solving a particular problem in designing a multishell target for inertial confinement fusion.

22241 Numerical simulations of magnetohydrodynamic chemically reactive flows in three dimensions on a vector computer. Hain, K.; Hain, G. (Naval Research Lab., Washington, DC (USA). Plasma Physics Div.). *Computer Physics Communications;* **27**: No. 4, 325-333(Oct 1982).

Extensive simulations of chemically reactive magnetohydrodynamic flows have been performed at the Naval Research Laboratory. The paper discusses briefly the numerical scheme and the use of virtual disc storage. It shows how the data flow for the computation of chemical reactions is organized to achieve an optimal computing speed. As an example the plasma flow around the earth is simulated. The results show a detailed structure, therefore demonstrating the almost complete lack of diffusion.

22242 Microscopic theory of intrinsic shear and bulk viscosities. Sung, W. (State Univ. of New York, Stony Brook); Karkheck, J.; Stell, G. *Journal of Statistical Physics;* **27**: No. 3, 513-532(1982).

A microscopic theory of intrinsic shear and bulk viscosities of solutions is given for a model of particles that interact with hard-sphere cores and weak long-range attraction. The approximation considered (the velocity chaos assumption of the Enskog theory) can be expected to yield quantitatively useful values for viscosities of the model solute-solvent system when the solute particles are not much larger than the solvent particles. Under solute-solvent mixing conditions of constant pressure and temperature, it is found that the intrinsic viscosities of a hard-sphere solute in a hard-sphere solvent can be positive or negative, depending upon size and mass ratios; for solute and solvent particles whose mass ratio equals their volume ratio, the intrinsic shear and bulk viscosities are always positive for solute particles larger than solvent particles: in the opposite case, the intrinsic shear viscosity is always negative while the intrinsic bulk viscosity is for the most part negative, becoming positive again when the solute particle is sufficiently small. For solute particles smaller than solvent particles, this result is sensitive to change in mass ratio. The addition of solvent-solvent attraction is found to lower the intrinsic viscosities substantially; the addition of solute-solvent attraction raises it. Detailed quantitative analysis of these effects is given.

22243 Non-uniform fluids. Percus, J.K. (New York Univ., NY). pp 31-140 of Liquid state of matter: fluids, simple and complex. Montroll, E.W.; Lebowitz, J.L. (eds.). Amersterdam, Netherlands; North-Holland Publishing Co. (1982). Contract AC02-76ER03077.

A brief review of the ideal gas in an external field is given in order to introduce local therodynamics. Next, the bulk properties of three-dimensional fluids are described in terms of the principal classes of approximations in current use: mean field theory, integral equations obtained by functional expansion, dynamical approximation methods, distribution function hierarchies and their truncations, and perturbation methods. Then, an analysis of nonuniform simple fluids is given in the general format of linear response theory. The emphasis then shifts to the two-phase interface and to techniques of which local thermodynamics is progenitor. (SC)

6450 High Energy Physics

REFER ALSO TO CITATION(S) 21522, 21524, 22345

22244 (DOE/ER/03023—31) High-energy physics at Tufts University. Final report. (Tufts Univ., Medford, MA (USA)). 31 Dec 1982. Contract AC02-76ER03023. 27p. NTIS, PC A03/MF A01. Order Number DE83007503.

This Final Report summarizes research accomplished at Tufts University in High Energy Physics during the period 1957 to 1982, with emphasis on the period since 1979 when next previous such summary report was submitted. Activities and publications up to 31 December 1982 and not earlier reported are listed. Principal accomplishments during the past six years include: measurement of the near equality of the charmed D^0 and D^{+-} lifetimes; determination of important features of nu/sub μ/ cross sections on nucleons, of majority quark momentum distributions, of charmed Λ/sub c/$^+$ production and decay of quark and di-quark fragmentation, and of Z^0 left-handed couplings to u- and d-quarks; the second observation of the upsilon particle; the hadronic production of the J/psi particle via the chi charmonium state; observation of virtual-photon shadowing in deep-inelastic muon scattering; and observation of evidence for two new scalar meson states. In theoretical work, a detailed understanding of the nature of optimal representations of amplitudes and observables in scattering processes has been achieved.

22245 (DOE/ER/03533—1) Research program in elementary particle theory. Progress report for the period ending June 30, 1983. (Syracuse Univ., NY (USA)). 1983. Contract AC02-76ER03533. 47p. NTIS, PC A03/MF A01. Order Number DE83007601.

The Syracuse High-Energy Theory group has contributed significantly to many of the current areas of active research in particle physics. Multigenerational grand unified theories have been explored in depth and the predictions of grand unified theories for proton decay have been critically examined. The properties of magnetic monopoles predicted by such theories have been studied. Topological solutions predicted by chiral and other phenomenologically interesting models have been studied. Various properties of glueballs have been explored using the effective Lagrangian approach. Now results of neutrinoless double beta decay in lepton-number-violating gauge theories were found. Aspects of galaxy formation, the nature of phase transitions in general field theories, and properties of supersymmetric theories have been explored. Progress has also been made in the formulation of relativistic particle dynamics. Publications are listed.

22246 (FERMILAB-CONF—82/36-THY) **Future accelerators and their contributions.** Bjorken, J.D. (Fermi National Accelerator Lab., Batavia, IL (USA)). May 1982. Contract AC02-76CH03000. 21p. (CONF-820165—1). NTIS, PC A02/MF A01. Order Number DE83006478.

From Pan American symposium on HEP and technology; Cocoyoc, Mexico (4 Jan 1982).

Future directions to be taken in the development of high energy accelerators to provide the most valuable physics research are discussed. Some projections are made about physics areas to be studied. The nominal order of magnitude for most processes of interest are, at the energy scale of 100 to 1000 TeV, of order 10^{-35} cm^2. Luminosity is important. (GHT)

22247 (LA—9572-C-Vol.1, pp 245-249) **Low energy frontier.** Glashow, S.L. (Harvard Univ., Cambridge, MA). Nov 1982. NTIS, PC A18/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

Nineteen areas of study are proposed. They are: electric dipole moments of the neutron and of the electron; the magnetic dipole moments of baryons; precision studies of CP violation in K^0 decay; the search for rare decay modes; the study of double beta decay; neutron-antineutron oscillations; proton decay; magnetic monopoles; the mass of the electron neutrino; neutrino oscillations; solar neutrinos; solar antineutrinos; superheavy isotopes; fractional electric charge; medium energy hadron spectroscopy; axions; precision cosmic ray physics; galactic neutrinos or photinos and uv astronomy; and medium energy meson-nucleus scattering and heavy ion collisions. (GHT)

22248 (LA—9572-C-Vol.1, pp 367-390) **Possibilities for nuclear physics studies at LAMPF II.** Seth, K.K. (Northwestern Univ., Evanston, IL). Nov 1982. NTIS, PC A18/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

This discussion covers muon beams, positron beams, photon beams, pion beams, deep hole states in nuclei, pion condensates in nuclei, pion-nucleon resonances, pion-pion interactions, pion resonances, proton beams, high momentum components and non-nucleonic degrees of freedom, and the quark interface. (GHT)

6451 Particle Interactions And Properties - Experimental

REFER ALSO TO CITATION(S) 21246, 21476, 21478, 21491, 21525, 22169, 22314, 22353, 22367

22249 (BNL—51602) **An e-p primer.** White, D.H. (Brookhaven National Lab., Upton, NY (USA)). 15 Oct 1982. Contract AC02-76CH00016. 25p. NTIS, PC A02/MF A01. Order Number DE83008470.

The basic formulas for kinematics and calculating yields of events for an e-p collider are presented, together with typical results.

22250 (DOE/ER/01195—474) **High-energy photoproduction of rho and phi vector mesons.** Callahan, P.H. (Illinois Univ., Urbana (USA)). 1983. Contract AC02-76ER01195. 216p. (COO—1195-474). NTIS, PC A10/MF A01. Order Number DE83007418.

We have studied the photoproduction of rho and phi vector mesons from hydrogen in the Fermilab broad band neutral beam. Forward going two particle final states were detected in a multiparticle spectrometer consisting of two analyzing magnets, a multiwire-proportional-chamber tracking system and a particle identification system. Recoil protons and target fragments were observed in a recoil detector which surrounded the target. The total elastic cross-sections were measured to be independent of energy at the 10% level from 35 to 225 GeV at 10.6 μb for the rho and from 35 to 165 GeV at 0.64 μb for the phi. The elastic differential cross-sections were also measured. Approximately 20% of the diffractive rho and phi events were found to be inelastic from an analysis of the recoil detector. The t-dependence of the fraction of diffractive events which are inelastic for both the phi and the psi are consistent with a universal function determined from the rho data.

22251 (DOE/ER/01195—479) **eP physics at the CBA.** Wiss, J.E.; White, D.H.; Morse, W.M. (Illinois Univ., Urbana (USA). Dept. of Physics; Brookhaven National Lab., Upton, NY (USA)). 1982. Contract AC02-76ER01195. 38p. (COO—1195-479). NTIS, PC A03/MF A01. Order Number DE83007419.

In this report we have tried to demonstrate how a 20 x 400 GeV eP facility at the CBA will complement the future physics of high energy $e+e^-$ and hadron-hadron colliders. By offering the first glimpse of the physics of 17 TeV muon and neutrino beams, an eP collider will extend tests of the standard model by about an order of magnitude in spacelike momentum transfer, and thus close the final kinematic gap of knowledge about electro-weak processes. It will be especially interesting to test whether the lefthanded nature of the charged current observed at low spacelike momentum transfers persists to large, spacelike momentum transfers. A high energy eP collider also enables unique tests of QCD such as a study of high Q^2 scale breaking and the high P/sub t/ QCD Compton process. In addition to probing small distance behavior in kinematic regions orthogonal to other collider facilities, an eP facility will generate data useful to understanding the physics of $e+e^-$ and hadron-hadron collisions. The current jet produced in the high energy eP neutral current process is produced against a single electron which can be used to predict the momentum of the quark which gives rise to the jet. Hence the central problem in jet physics of deducing the kinematics of a quark by measurement of its hadronization jet can be studied under uniquely controlled circumstances. Finally the high Q^2 structure functions of the proton which are essential in understanding hard process in hadron-hadron scattering can only be cleanly measured in an eP collider.

22252 (DOE/ER/03244—102) **Experimental medium-energy physics at Carnegie-Mellon University, 1968-1983.** (Carnegie-Mellon Univ., Pittsburgh, PA (USA)). Jan 1983. Contract AC02-76ER03244. 238p. (COO—3244-102). NTIS, PC A11/MF A01. Order Number DE83008136.

Past, present, and future activities are described. The major portion of the current research effort is directed toward studies on the weak decay of Λ-hypernuclei, the anti pp → anti ΛΛ reaction at threshold using LEAR, and mechanisms for pion annihilation in light nuclei. Experimental proposals at user facilities are summarized, publications are listed, and recent preprints are included. (WHK)

22253 (FERMILAB-CONF—82/25-EXP) **Charm and beauty photoproduction at Fermilab.** Appel, J.A. (Fermi National Accelerator Lab., Batavia, IL (USA)). Apr 1982. Contract AC02-76CH03000. 26p. (CONF-811195—6). NTIS, PC A03. Order Number DE82012930.

From Europhysics conference on the search for charm, beauty and truth at high energy; Erice, Italy (15 Nov 1981).

Four manifestations of charm have been observed in photoproduction at Fermilab so far. These four are: (1) multimuon indications of the total charm cross section and observations of (2) psi and psi′, (3) D^0 and D* and (4) Λ/sub c/. The relevant photoproduction experiments in the search for charm at Fermilab are the broad band neutral beam experiments by a Columbia-Fermilab-Illinois (CFI) collaboration, the Tagged Photon Beam experiment by the TPS collaboration and the muon beam experiment with an active iron target by the Berkeley-Fermilab-Princeton (BFP) collaboration.

22254 (FERMILAB-Conf—83/13-EXP) **Comparison of dimuon production by 125 GeV/c anti p and πp with predictions of the Drell-Yan model.** Cox, B. (Fermi National Accelerator Lab., Batavia, IL (USA)). Jan 1983. Contract AC02-76CH03000. 10p. (CONF-8210107—2). NTIS, PC A02/MF A01. Order Number DE83007136.

From Workshop on Drell-Yan processes; Batavia, IL, USA (7 Oct 1982).

The measurements of dimuon production ($M >$ GeV/c^2) by 125 GeV/c anti p and π^- performed by Fermilab Experiment 537 are compared to the predictions of the Drell-Yan model in this report. We find that the naive Drell-Yan cross sections calculated using CDHS and NA3 structure functions are too low by factors of 2.25 +- 0.45 and 2.50 +- 0.50 to reproduce the levels of our anti p and π^- cross sections respectively. The shapes of the dσ/dx/sub F/ and M^3 dσ/dM differential cross sections are well reproduced by the naive zeroth order formula. The shape of the dσ/dp/sub T/ cross section for the dimuons as measured by E-537 can be fit using the Alterelli, Parisi, and Petronzio O(α/sub s/) prescription for calculating P/sub T/ distributions but requires $<$ k/sub T/^{2} $>$ of the interacting constituents of the nucleons and pion of 0.88 (GeV/c)^2. This $<$ k/sub T/^{2} $>$ is larger than the $<$k/sub T/^{2} $>$/sub π/ = 0.59 +- 0.05 (GeV/c)^2 and $<$ k/sub T/^{2}$>$/sub P/ = 0.52 +- 0.05 (GeV/c)^2 obtained from the linear extrapolations of the s variation of the $<$ P/sub T/^{2}$>$ of the experimentally observed dσ/dp/sub T/ distributions to s-O. This implies that first order QCD in the formalism of Altarelli, Parisi, and Petronzio is insufficient to explain $<$ P/sub T/^{2} $>$ of the data.

22255 (INIS-mf—7432, pp vp) **Proposed experiment to study the dissociation process n$\rightarrow\Lambda^0K^0$.** Nemecek, S.; Novak, M. (Ceskoslovenska Akademie Ved, Prague. Fyzikalni Ustav:. [nd]. (In Czech). NTIS (US Sales Only), PC A06/MF A01.

From 6. conference of Czechoslovak physicists; Ostrava, Czechoslovakia (27 Aug 1979).

22256 (LA—9572-C-Vol.2, pp 409-412) **Muon working group report.** Heffner, R.H. (Los Alamos National Lab., NM). Nov 1982. NTIS, PC A17/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

A brief summary of the working group study is given. Topics touched on by the group include: reviews of the estimated muon fluxes for stopping muon beams at LAMPF II and at the PSR; pulsed muon beams at the PSR (Proton Storage Ring); the possibility of a new muon g-2 experiment at LAMPF II; undetected parity violating decays in muonic atoms; measurement of auger electrons emitted from high lying transitions in muonic atoms carried out at SIN; muon capture; muon-minus induced fission; and the use of a macroscopic timing technique to measure time-differential muon decay spectra. (GHT)

22257 (LA—9572-C-Vol.2, pp 413-421) **Search for exotics in two-body decay of K^+: K/sub $\mu/_2$ and K/sub $\pi/_2$ revisited.** Yamazaki, T. (Univ. of Tokyo, Japan). Nov 1982. NTIS, PC A17/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

A new light is shedded on K/sub $\mu/_2$ and K/sub $\pi/_2$ decays of K^+ in view of possible existence of heavy neutrinos and Higgs particles, which could be revealed in high-resolution spectroscopy in a wide momentum range. A recent experiment done at KEK is described and future perspectives are given.

22258 (LA—9572-C-Vol.2, pp 428-439) **Application of positive K mesons in solid-state physics: requirements and perspectives.** Seeger, A. (Max-Planck-Institut fuer Metallforschung, Stuttgart, Germany). Nov 1982. NTIS, PC A17/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

Future kaon factories will permit experiments based on the lattice steering (channelling) of the positive muons (μ^+) produced by the decay of positive kaons (K^+) implanted into highly perfect crystals. The requirements for and the potential of such K^+/μ^+ lattice-steering experiments are discussed. It is concluded that with beams of about 10^7 K^+/s at momentum p/sub K/ = 550 MeV/c or of about 10^8 K^+/s at p/sub K/ = GeV/c such experiments are very promising and a valuable supplement to the π^+/μ^+ lattice-steering experiments.

22259 (LA—9572-C-Vol.2, pp 440-463) **Muon capture reaction (μ^-,nu/sub μ/) with nuclei.** Walecka, J.D. (Stanford Univ., CA). Nov 1982. NTIS, PC A17/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

A pulsed source fo stopped μ^- and experimental muon facility associated with the Pulsed Storage Ring (PSR) under construction at LAMPF is a distinct possibility. With a new superconducting solonoid muon channel, one could expect negative muon fluxes at the PSR to match or exceed those at the present LAMPF Stopped Muon Channel (SMC). The time structure of the beam opens a whole new range of experimental possibilities in nuclear muon capture. With LAMPF II, the μ^- flux could exceed that at SMC by up to two orders of magnitude. With the possibilities of these greatly improved and more versatile μ^- beams, it seems appropriate to reexamine the subject of muon capture on nuclei. The purpose of this contribution is to give an overview response to the question what can be learned from the muon capture reaction (μ^-,nu/sub μ/) on nuclei.

22260 (LA—9572-C-Vol.2, pp 464-466) **Rare decay and hyperons.** Mischke, R.E. (Los Alamos National Lab., NM). Nov 1982. NTIS, PC A17/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

The working group on Rare Decays and Hyperons considered several topics of potential interest for LAMPF II. Presentations were made by several persons and much discussion followed. My impression of our conclusion is that while the arguments for a next generation of rare K decay experiments are strong and the need for LAMPF II obvious, the situation for hyperon physics is less clear. Since some hyperon experiments can best be done at FNAL or the SPS, it will require detailed design to determine the class of experiments for which LAMPF II excels.

22261 (LA—9572-C-Vol.2, pp 467-489) **Experimental study of the electromagnetic decays of the Λ and Σ excited states.** Hynes, M.V. (Los Alamos National Lab., NM). Nov 1982. NTIS, PC A17/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

Electromagnetic decays have served as bench marks in the developing stages of the shell model in nuclei. The quark confinement pictures for baryons are now in a similar developing stage. This experiment will test in an unambiguous way, the configurations present in the low lying excited states of the Λ and Σ by measuring the electromagnetic branching ratios that connect them. Experimentally, about half of the decays should be measured at FNAL using the hyperon beam via the Primakoff effect. The remaining transitions, including the very interesting forbidden ones, will require the K fluxes and purities available at LAMPF II.

22262 (LA—9572-C-Vol.2, pp 490-536) **Measurement of the rare decay $K^+ \rightarrow \pi^+$ nu anti nu.** Ferro-Luzzi, M. (CERN, Geneva, Switzerland). Nov 1982. NTIS, PC A17/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

This is an abridged version of the CERN proposal CERN/PSCC 82-24; the specific issues relevant to a possible performance of the experiment at CERN have been omitted. This experiment, although feasible with present beams and present accelerators, would benefit considerably from the larger intensities planned for machines of the type of LAMPF II. In particular, the higher flux of K mesons could be exploited, not so much to increase the statistics or to reduce the running time, but to perform a better K/π separation. This would decrease the background and the accidental rates which at present are the real limiting factors of the proposed measurement.

22263 (LA—9572-C-Vol.2, pp 538-541) **LAMPF II neutrino working group.** Carlini, R. (Los Alamos National Laboratory, NM). Nov 1982. NTIS, PC A17/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

The neutrino working group addressed five general topics of interest to the neutrino community. These were nu/sub μ/e scattering, nu/sub e/e scattering, nu oscillation, nu/sub μ/P scattering and neutrino-nuclear reactions.

22264 (LA—9572-C-Vol.2, pp 560-583) **Neutrino interactions with nuclei.** Walecka, J.D. (Stanford Univ., CA). Nov 1982. NTIS, PC A17/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

In this brief contribution we concentrate on giving an overview response to the question what can be learned from neutrino reactions with nuclear targets. We start with the most sophisticated and experimentally most complex topic, yet in a certain sense it is also the simplest and cleanest. We examine tests of the Standard Theory of Electro-Weak Interactions. The tests are model-independent in the sense that they are relations between experimental quantities which are direct consequences of the WSG theory, but they are independent of the detailed structure of the nucleus. Such relationships were anticipated by Weinberg. Some general considerations are given on neutrino reactions with nuclei, focusing largely on charged-lepton production. We demonstrate that Intermediate-energy neutrino reactions have a central and unique role to play in our understanding of semi-leptonic weak interactions and illustrate this point by discussing a complete kinematic experiment on the nucleon.

22265 (LA—9572-C-Vol.2, pp 584-592) **Neutrino oscillation searches at CERN.** Vannucci, F. (LPHNE, Paris, France). Nov 1982. NTIS, PC A17/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

Various neutrino oscillation projects which have been put forth at CERN are discussed. Three proposals use the present detectors: BEBC, CDHS, and CHARM. They require a new low-energy neutrino beam, which is being constructed. One proposal uses the present high-energy SPS beam. It requires a new fine-grain detector. Approval of this experiment is still pending. There are two methods of measuring oscillations. The disappearance method measures the flux of a given neutrino (in our case nu/sub μ/ as a function of the distance R from the production target. Without oscillation the flux decreases as $1/R^2$; with oscillation it decreases faster. In the appearance method a new species of neutrino is searched for, for instance nu/sub e/ in a pure nu/sub μ/ initial beam. For experimental reasons, CDHS and CHARM use the disappearance method between two detectors positioned at two different distances, while BEBC chooses the appearance method, at a fixed distance. The high-energy experiment proposes to use the two methods simultaneously, thus having extra control over possible sources if an effect is found.

22266 (LA—9572-C-Vol.2, pp 602-604) **Possibility of observing nu p elastic scattering in a hydrogen bubble chamber at LAMPF II.** Hoffman, C.M. (Los Alamos National Lab., NM). Nov 1982. NTIS, PC A17/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

There is great interest in accurately measuring nu/sub μ/p elastic scattering (and anti nu/sub μ/p elastic scattering). These reactions proceed through the weak neutral current (WNC). An accurate measurement of the cross sections would provide a detailed test of the Weinberg-Salam model. The present world's supply of events totals ~ 300 nu/sub μ/p and ~ 150 anti nu/sub μ/p events with $q^2 \geqq 0.3$ $(GeV/c)^2$. Existing and proposed measurements are plagued by large backgrounds and systematic uncertainties. Extending the measurements to lower q^2 would be the most accurate determination of the space-time structure of the WNC. The experimental difficulty in achieving an accurate measurement of the elastic scattering cross secction is primarily the poor event signature. All one can detect is the low energy recoil proton. The kinematic energy of the proton is related to q^2 by q^2 = 2m/sub p/T/sub p/. Thus measuring at lower q^2 implies measuring lower energy recoil protons. The problem is compounded for protons bound in nuclei. The Fermi momentum of the initial state proton and the nuclear binding energies distort the observed q^2 spectrum. A detector which completely avoids these problems is a hydrogen bubble chamber as all of the protons are free. In addition, the correction due to nu n → nu n events where the neutron charge exchanges is not present. In past experiments this has been a large correction (20 to 30%). Finally, a hydrogen bubble chamber is an ideal detector for neutrino-proton elastic scattering as it is, in essence, the ultimate fine-grained instrument to observe low energy recoil protons.

22267 (LA—9572-C-Vol.2, pp 643-647) **Hadronic atoms at a kaon factory.** Leon, M. (Los Alamos National Lab., NM). Nov 1982. NTIS, PC A17/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

Beyond doubt, the advent of a kaon factory will be of immense significance for the study of hadronic atoms. Here we will discuss some classes of experiments that certainly can and will be done at a kaon factory, as well as some very interesting possibilities which deserve investigation. Among the certains we include the observation of hadronic x rays from kaonic and Σ^- atoms, for both Z greater than one and for the isotopes of hydrogen, mainly for strong interaction information. More conjectural is the possibility of measuring Xi$^-$ and Ω^- x rays.

22268 (LBL—15469) **Expectations for old and new physics at high energy colliders.** Cahn, R.N. (Lawrence Berkeley Lab., CA (USA); European Organization for Nuclear Research, Geneva (Switzerland)). Dec 1982. Contract AC03-76SF00098. 46p. (CONF-820897—1). NTIS, PC A03/MF A01. Order Number DE83006968.

From Conference on physics at very high energy; Stanford, CA, USA (16 Aug 1982).

During the past year, the first data from the SPS collider at CERN have become available. The initial results are only a glimpse at a new energy regime and we can reasonably expect an increase in the extent of the data by a factor of 10^4 to 10^5. Moreover, within a few years, the Fermilab Tevatron Collider will be in operation with a center of mass energy nearly four times as great as that at CERN. Beyond these machines are other possibilities: a high luminosity pp machine at Brookhaven with a center of mass energy of 0.8 TeV; a p anti p or pp machine in the LEP tunnel at CERN; a desetron in the southwestern United States with many TeV in the center of mass. The purpose of these lectures is to provide an orientation for the wealth of data that these machines will provide.

22269 (NP—391355) **Hadron production in πi p, K^+ p and pp collisions at 147 GeV/c and properties of jet-like multiparticle systems.** (Istituto Nazionale di Fisica Nucleare, Pavia (Italy)). Jan 1981. 32p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83901355.

The gross features of the data are reviewed and the momentum tensor components, <S>, and <T> are studied. Evidence for coplanarity effects is observed. A probabilistic method to search for jets is proposed. The jets found by this method are found to be similar to high P/sub T/ jets from pp interactions, e^+e^- annihilations and γ/sub p/ interactions. The effect of subtracting the leading particles and the effect of low p/sub T/ diffractive and non diffractive components are investigated.

22270 (SLAC-PUB—2981) **First results from DELCO at PEP.** Atwood, W.B.; Baillon, P.H.; Barish, B.C. (California Inst. of Tech., Pasadena (USA); Stanford Linear Accelerator Center, CA (USA); Stanford Univ., CA (USA)). Oct 1982. Contract AC03-76SF00515. 7p. (CONF-820718—30). NTIS, PC A02/MF A01. Order Number DE83007005.

From 21. international conference on high energy physics; Paris, France (29 Jul 1982).

Preliminary results from DELCO are presented on several topics which utilize the particle identification capabilities of the detector: (1) we measure the Cabbibo angle in tau decays to be $\tan^2$ theta/sub c/ = 0.08 +- 0.03 +- 0.04; (2) in the intermediate x (p/E/sub BEAM/) range, $0.2 < x < 0.55$, the fraction of π^{+-} relative to all charged particles is found to be approximately 60% and to show only a weak energy dependence; and (3) we observe a large

D^{*+-} cross section ratio, R/sub D^{*+-}/ = $\sigma(e^+e^- \to D^{*+-}X)/\sigma$/ sub $\mu\mu$/ = 2.0 +- 0.6 +- 0.7 in the z (E/sub D^*//E/sub BEAM/) range above 0.3. In contrast with the lighter quarks, the fragmentation of charmed quarks occurs predominantly at large values of z; we measure <z> = 0.6 +- 0.1.

22271 **(SLAC-PUB—2982) Heavy-quark fragmentation fom e^+e^- annihilation and nu N scattering experiments.** Schlatter, D. (Stanford Linear Accelerator Center, CA (USA)). Sep 1982. Contract AC03-76SF00515. 17p. (CONF-820897—2). NTIS, PC A02/MF A01. Order Number DE83007004.

From Conference on physics at very high energy; Stanford, CA, USA (16 Aug 1982).

The review covers early results, recent results from nu N scattering experiments, charm production in e^+e^- at high energies, D^+ cross-section in e^+e^- annihilation, inclusive electrons in hadronic e^+e^- events, and inclusive hadron spectra and scale breaking in e^+e^- annihilation. 30 references, 18 figures. (GHT)

22272 **(SLAC-PUB—2988) Photon-photon collisions.** Burke, D.L.;. (Stanford Linear Accelerator Center, CA (USA)). Oct 1982. Contract AC03-76SF00515. 12p. (CONF-820718—29). NTIS, PC A02/MF A01. Order Number DE83007011.

From 21. international conference on high energy physics; Paris, France (29 Jul 1982).

Studies of photon-photon collisions are reviewed with particular emphasis on new results reported to this conference. These include results on light meson spectroscopy and deep inelastic $e\gamma$ scattering. Considerable work has now been accumulated on resonance production by $\gamma\gamma$ collisions. Preliminary high statistics studies of the photon structure function F_2/sup γ/(x,Q^2) are given and comments are made on the problems that remain to be solved.

22273 **(SLAC-PUB—2989) Review of e^+e^- physics at PEP - 1982.** Hollebeek, R. (Stanford Linear Accelerator Center, CA (USA)). Oct 1982. Contract AC03-76SF00515. 17p. (CONF-8208103—2). NTIS, PC A02/MF A01. Order Number DE83007063.

From 4. European symposium on anti NN and anti QQ interactions; Santiago de Compostella, Spain (30 Aug 1982).

Results obtained at PEP by the MARK II, MAC and DELCO collaborations in the past year are reviewed. They include QED tests, measurements of tau lepton properties, charm and bottom fragmentation functions, scaling violations, energy correlations and the total hadronic cross section.

22274 **(SLAC-PUB—3001) Particle searches in e^+e^- experiments at PEP and PETRA.** Lau, K.H. (Stanford Linear Accelerator Center, CA (USA)). Oct 1982. Contract AC03-76SF00515. 18p. (CONF-820897—3). NTIS, PC A02/MF A01. Order Number DE83007013.

From Conference on physics at very high energy; Stanford, CA, USA (16 Aug 1982).

This talk reviews recent results in new particle searches performed by experiments at the high energy e^+e^- storage rings PEP and PETRA. It concentrates on recent searches for: hadrons with a new quark flavor, spin-1/2 charged heavy leptons, spin-0 charged leptons, spin-0 point-like scalars or pseudoscalars, and neutral heavy leptons.

22275 **(SLAC-PUB—3005) New-particle spectroscopy, quarkonium and gluonic mesons.** Bloom, E.D. (Stanford Linear Accelerator Center, CA (USA)). Oct 1982. Contract AC03-76SF00515. 24p. (CONF-820718—27). NTIS, PC A02/MF A01. Order Number DE83007012.

From 21. international conference on high energy physics; Paris, France (29 Jul 1982).

Recent experimental results on quarkonium and gluonic mesons are presented and discussed. Comparisons with theory are made. Quarkonium predictions seem to agree well with experiment. The question of the experimental verification of gluonic mesons is clouded by the difficulty of the theoretical interpretation.

22276 **(SLAC-PUB—3017) Summary talk for the Brookhaven spin physics conference, 1982.** Prescott, C. (Stanford Linear Accelerator Center, CA (USA)). Nov 1982. Contract AC03-76SF00515. 9p. (CONF-820941—14). NTIS, PC A02/MF A01. Order Number DE83007025.

From 5. international symposium on high energy spin physics; Upton, NY, USA (16 Sep 1982).

I review the following highlights of this conference: polarized hyperon production, magnetic moments, symmetries, polarized ep physics, hadronic processes and QCD, and future prospects at colliders.

22277 **Observation of P-wave bb-bar bound states.** Han, K.; Boehringer, T.; Franzini, P. (Columbia University, New York, New York 10027). *Physical Review Letters;* **49**: No. 22, 1612-1616(29 Nov 1982).

The existence of P-wave bb-bar bound states chi/sub b//sup prime/ is demonstrated by observing photons from the transition Y''→γ+chi/sub b//sup prime/ in the inclusive photon spectrum from Y'' decays. The center of gravity of the observed photon energies is 98 MeV and the branching ratio for the transition of the Y'' to the chi/sub b//sup prime/ states if (34 +- 3)% (statistical).

22278 **Evidence for chi/sub b//sup prime/ production in the exclusive reaction Y''→γchi/sub b//sup prime/→($\gamma\gamma$Y' or $\gamma\gamma$Y).** Eigen, G.; Blanar, G.; Dietl, H. (Max-Planck-Institut fuer Physik, D-8000 Munich 40, Federal Republic of Germany). *Physical Review Letters;* **49**: No. 22, 1616-1619(29 Nov 1982).

Evidence is presented for the production of chi/sub b//sup prime/ states (2 ^{3}P) in the reaction Y''→γchi/sub b//sup prime/ →$\gamma\gamma$Y' (or $\gamma\gamma$Y) with subsequent decay of the Y' (Y) into e^+e^- or $\mu^+\mu^-$. The data were obtained with the nonmagnetic CUSB detector at the Cornell e^+e^- storage ring. Observed were 14 (15) events consistent with the transition to the Y' (Y) with an estimated background of 1.7 (1.3) events. The lower-energy photons cluster around 100 MeV, implying M(Y'')-M(chi/sub b//sup prime/)~100 MeV. A single line interpretation of the lower-energy photon spectrum is disfavored.

22279 **Reaction πp p→phiphin and evidence for glueballs.** Etkin, A.; Foley, K.J.; Longacre, R.S. (Brookhaven National Laboratory, Upton, New York 11973). *Physical Review Letters;* **49**: No. 22, 1620-1623(29 Nov 1982). Contract AC02-76CH00016;AC02-79ER10550.

The authors have detected 1203 events of the reaction π^-p→phiphin at 22 GeV/c, and have performed a partial-wave analysis of the phiphi system. The results are well represented by two resonances, both with quantum numbers I/sup G/ = 0^+, J/sup P/C = 2^{++}. The breakdown of the Okubo-Zweig-Iizuka suppression observed in this reaction is naturally explained in the context of QCD if these states are considered to be glueball candidates.

22280 **Radiative width of the A_2(1310).** Cihangir, S.; Berg, D.; Biel, J.; Chandlee, C.; Collick, B.; Droege, T.; Ferbel, T.; Heppelmann, S.; Huston, J.; Jensen, T. (Fermi National Accelerator Lab., Batavia, IL (USA). *Physics Letters, [Section] B;* **117**: No. 1/2, 119-122(4 Nov 1982).

Fermilab-Minnesota-Rochester Collaboration.

Using the Primakoff formalism, we have extracted the radiative decay width of the A_2^+(1310) produced in coherent interactions of 200 GeV/c π^+ mesons in nuclear targets. The width obtained is 295 +- 60 keV, a value consistent with quark-model predictions.

22281 **Radiative width of the Ksup(*+)(1430).** Cihangir, S.; Berg, D.; Biel, J.; Chandlee, C.; Collick, B.; Droege, T.; Ferbel, T.; Heppelmann, S.; Huston, J.; Jensen, T. (Fermi National Accelerator Lab., Batavia, IL (USA). *Physics Letters, [Section] B;* **117**: No. 1/2, 123-125(4 Nov 1982).

Fermilab-Minnesota-Rochester Collaboration.

Using the Primakoff formalism, we have extracted the radiative decay width of the Ksup(*)$^+$(1430) produced in coherent interactions of 200 GeV/c K^+ mesons in nuclear targets. The width obtained is 240 +- 45 keV, a value reasonably consistent with quark-model predictions.

22282 **Charmed-baryon production in $\nu D \rightarrow \mu^- \Lambda X$ reactions.** Son, D.; Snow, G.A.; Chang, C.Y. (University of Maryland, College Park, Maryland 20742). *Physical Review Letters;* **49**: No. 16, 1128-1131(18 Oct 1982).

Single Λ production with no other strange particles in the final state is observed in charged-current neutrino interactions in the deuterium-filled 15-ft bubble chamber at Fermilab. This phenomenon is interpreted as a signal for inclusive production of charmed baryons followed by Λ/sub c/$^+ \rightarrow \Lambda + X$ decays. The total Λ/sub c/$^+$ cross section times branching ratio for this process is found to be (2.0 +- 0.74 +- 0.65)% of the total charged-current neutrino cross section.

6452 Particle Interactions And Properties - Theoretical

REFER ALSO TO CITATION(S) 22254, 22326, 22329, 22332, 22402, 22403

22283 **(DOE/ER/40008—29) QCD Monte-Carlo models for e^+e^- annihilations and hadron-hadron collisions.** Field, R.D.; Fox, G.C. (Florida Univ., Gainesville (USA). Dept. of Physics; California Inst. of Tech., Pasadena (USA)). 1982. Contract AS05-81ER40008. 64p. (CONF-820983—3). NTIS, PC A04/MF A01. Order Number DE83006482.

From Europhysics study conference on jet structure from quark and lepton interactions; Erice-Trapani-Sicily, Italy (12 Sep 1982).

QCD Monte-Carlo models for the production of parton and hadron showers in e^+e^- annihilations that do not rely on the limited transverse-momentum jet parameterization of Feynman and Field are examined and extended to hadron-hadron collisions. Evidence for gluon Bremsstrahlung effects in large p/sub T/ hadron-hadron collisions is presented, and recent data from CERN and Fermilab for both large- and small-aperture transverse-energy calorimeter triggers are discussed.

22284 **(FERMILAB-CONF—82/91-THY) Hadron jets in perspective.** Quigg, C. (Fermi National Accelerator Lab., Batavia, IL (USA)). Nov 1982. Contract AC02-76CH03000. 11p. (CONF-8209100—1). NTIS, PC A02/MF A01. Order Number DE83006644.

From Europhysics study conference on multibody phenomena in strong, electromagnetic, and weak interactions; Erice, Italy (11 Sep 1982).

The subject of hadron jet studies, to judge by the work presented at this workshop, is a maturing field which is still gathering steam. The very detailed work being done in lepton-lepton and lepton-hadron collisions, the second-generation measurements being carried out at Fermilab, the CERN SPS, and the ISR, and the very high energy hard scatterings being observed at the CERN Collider all show enormous promise for increased understanding. Perhaps we shall yet reach that long-sought nirvana in which high-p/sub perpendicular/ collisions become truly simple.

22285 (INIS-mf—7432, pp vp) **New expression for the Froissart bound on the scattering amplitude.** Chaichian, M. (Helsinki Univ. (Finland). Dept. of Theoretical Physics); Fishcer, J. (Ceskoslovenska Akademie Ved, Prague. Fyzikalni Ustav); Molodenskij, S.M.; Nelipa, N.F. (Moskovskij Gosudarstvennyj Univ. (USSR). Nauchno-Issledovatel'skij Inst. Yadernoj Fiziki); Vrkoc, I. (Ceskoslovenska Akademie Ved, Prague. Matematicky Ustav). [nd]. (In Czech). NTIS (US Sales Only), PC A06/MF A01.

From 6. conference of Czechoslovak physicists; Ostrava, Czechoslovakia (27 Aug 1979).

22286 (INIS-mf—7432, pp vp) **Stripping model of hadron collisions.** Kundrat, V.; Lokajicek, M.V. (Ceskoslovenska Akademie Ved, Prague. Fyzikalni Ustav:. [nd]. (In Czech). NTIS (US Sales Only), PC A06/MF A01.

From 6. conference of Czechoslovak physicists; Ostrava, Czechoslovakia (27 Aug 1979).

22287 (INIS-mf—7432, pp vp) **Impact parameter structure of non-diffractive collisions.** Kundrat, V.; Lokajicek, M.; Lokajicek, M. Jr.; Sedlak, J. (Ceskoslovenska Akademie Ved, Prague. Fyzikalni Ustav:. [nd]. (In Czech). NTIS (US Sales Only), PC A06/MF A01.

From 6. conference of Czechoslovak physicists; Ostrava, Czechoslovakia (27 Aug 1979).

22288 (INIS-mf—7432, pp vp) **Annihilation of systems anti d-d and anti d-p.** Sedlak, J.; Simak, V. (Ceskoslovenska Akademie Ved, Prague. Fyzikalni Ustav:; Vavra, J. (Ceske Vysoke Uceni Technicke, Prague (Czechoslovakia)). [nd]. (In Czech). NTIS (US Sales Only), PC A06/MF A01.

From 6. conference of Czechoslovak physicists; Ostrava, Czechoslovakia (27 Aug 1979).

22289 (INIS-mf—7432, pp vp) **Contribution of annihilation channels to p anti p interactions estimated from V^0 decays.** Herynek, I.; Ridky, J.; Simak, V.; Krepelova, O. (Ceskoslovenska Akademie Ved, Prague. Fyzikalni Ustav:. [nd]. (In Czech). NTIS (US Sales Only), PC A06/MF A01.

From 6. conference of Czechoslovak physicists; Ostrava, Czechoslovakia (27 Aug 1979).

22290 (INIS-mf—7432, pp vp) **Production of low mass dileptons in e^+e^- collisions.** Lichard, P. (Komenskeho Univ., Bratislava (Czechoslovakia). Prirodovedecka Fakulta). [nd]. (In Slovak). NTIS (US Sales Only), PC A06/MF A01.

From 6. conference of Czechoslovak physicists; Ostrava, Czechoslovakia (27 Aug 1979).

22291 (INIS-mf—7432, pp vp) **Quark-parton model and deep inelastic ep scattering.** Bohacik, J.; Nogova, A. (Slovenska Akademia Vied, Bratislava (Czechoslovakia). Fyzikalny Ustav); Lichard, P.; Pisut, J. (Komenskeho Univ., Bratislava (Czechoslovakia). Prirodovedecka Fakulta). [nd]. (In Slovak). NTIS (US Sales Only), PC A06/MF A01.

From 6. conference of Czechoslovak physicists; Ostrava, Czechoslovakia (27 Aug 1979).

22292 (INIS-mf—7432, pp vp) **Can the number of quark sorts be determined from high energy cross sections.** Blazek, M. (Slovenska Akademia Vied, Bratislava (Czechoslovakia). Fyzikalny Ustav). [nd]. (In Slovak). NTIS (US Sales Only), PC A06/MF A01.

From 6. conference of Czechoslovak physicists; Ostrava, Czechoslovakia (27 Aug 1979).

22293 (LA—9572-C-Vol.1, pp 115-135) **Rare decays of the K-meson.** Lubatti, H.J. (Univ. of Washington, Seattle). Nov 1982. NTIS, PC A18/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

The motivation for studying rare decays of the K-meson such as K/sub L/$^0 \rightarrow \mu e$ and $K^{+-} \rightarrow \pi\mu e$ which do not conserve lepton-flavor and are therefore frobidden within the framework of the Standard Model is reviewed. Existing upper limits and new, proposed measurements of the branching ratios are discussed. The decay mode $K^{+-} \rightarrow \pi^{+-}$ + missing neutrals, is examined. The difficulty of relating this mode to the number of neutrino flavors and its importance for testing supersymmetric models and the Standard Model is emphasized. A discussion of some new ideas for detectors is included.

22294 (LA—9572-C-Vol.1, pp 171-179) **Quarks in nuclei.** Goldhaber, A.S. (State Univ. of New York, Stony Brook). Nov 1982. NTIS, PC A18/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

There are certainly quarks in nuclei. Whether there are low energy nuclear effects described most simply in terms of quark configurations is not known. However, there remain to be tried many kinds of experiments which could bear on this question, including reactions which deposit energy and quantum numbers (but little momentum) in a nucleus. Doing these experiments will help to define the transition from quark to nucleon pictures, and thus to establish the foundation on which nuclear physics must rest.

22295 (LA—9572-C-Vol.1, pp 187-196) **Muon capture.** Deutsch, J. (Louvain Univ., Louvain-la-Neuve, Belgium). Nov 1982. NTIS, PC A18/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

We discuss: time-reversal invariance, neutrino-mixing, the mass of nu/sub μ/, nu/sub μ/ helicity, the μ-nucleon coupling, renormalization of weak couplings in nuclei, and improvements required.

22296 (LA—9572-C-Vol.1, pp 197-201) **Comments on hadron spectra and electroweak couplings.** Karl, G. (Univ. of Guelph, Ontario). Nov 1982. NTIS, PC A18/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

After a short introduction I comment on baryon magnetic moments, on the Ω^- electric quadrupole moment, on coupling constants for weak semileptonic decays and on the question of constituent gluons in baryons.

22297 (LA—9572-C-Vol.1, pp 202-220) **Nuclear response to p, anti p, π and K^{+-} projectiles up to a few GeV.** Walker, G.E. (Indiana Univ., Bloomington, IN). Nov 1982. NTIS, PC A18/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

A more general overview contrasting opportunities and challenges that one can anticipate at higher energies for several projectiles is given. Later sections discuss each projectile (p,p,π and K^{+-}) separately but in order to set the stage for the later discussion the nuclear response at conventional intermediate energies is reviewed for protons and pions. A list of some of the basic parameters that might influence the nuclear response includes (a) the mean free path of the projectile in nuclear matter, (b) the relative strength of the projectile-nucleon amplitudes in various spin-isospin channels, (c) the resonance structure of the amplitudes (including elasticity and free resonance width), (d) the relative strength and free threshold for production of mesons and baryons not present in the incident channel, (e) the energy and momentum transfer delivered to the target.

22298 (LA—9572-C-Vol.1, pp 221-231) **Rare pion decays.** Bryman, D. (TRIUMF, Vancouver, British Columbia). Nov 1982. NTIS, PC A18/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

The status and outlook for studies of some rare pion decays is discussed. Improved charged pion beams and tagged π^0 beams derived from an intense source of K/sub $\pi/_2$ decays will provide new opportunities for experiments at LAMPF II and the Kaon Factory.

22299 (LA—9572-C-Vol.1, pp 289-301) **Recent experimental results on Σ-hypernuclei.** Peng, J.C. (Los Alamos National Lab., NM). Nov 1982. NTIS, PC A18/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

Recent experimental results on Σ-hypernuclei obtained at CERN are presented. Evidence of narrow states are reported in the (K^-,π^-) and the (K^-,π^+) reactions of ^{12}C and ^{16}O with kaon momentum of 400 and 450 MeV/c. A preliminary estimate of the isospin dependent potential and the spin-orbit potential for p-shell Σ-hypernuclei is made.

22300 (LA—9572-C-Vol.1, pp 362-366) **Brief look at N-nucleus physics at 1 to 16 GeV.** Moss, J.M. (Los Alamos National Lab., NM). Nov 1982. NTIS, PC A18/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

I examine what is known about the N-N interaction in the energy range of 1 to 16 GeV, and what the implications are for N-nucleus physics. Additionally, some suggestions are made for areas of future experiments and what machine capabilities should be included for primary hadron beams.

22301 (SLAC—245) **Proceedings of Summer Institute of Particle Physics, July 27-August 7, 1981: the strong interactions.** Mosher, A. (ed.). (Stanford Linear Accelerator Center, CA (USA)). Jan 1982. Contract AC03-76SF00515. 714p. (CONF-810770—). NTIS, PC A99/MF A01. Order Number DE82012505.

From Summer institute on particle physics; Stanford, CA, USA (27 Jul 1981).

The ninth SLAC Summer Institute on Particle Physics was held in the period July 27 to August 7, 1981. The central topic was the strong interactions with the first seven days spent in a pedagogic mode and the last three in a topical conference. In addition to the morning lectures on experimental and theoretical aspects of the strong interactions, three were lectures on machine physics; this year it was electron-positron colliding beam machines, both storage rings and linear colliders. Twenty-three individual items from the meeting were prepared separately for the data base. (GHT)

22302 (SLAC-PUB—3003) **Testing GUTs: where do monopoles fit.** Ellis, J. (Stanford Linear Accelerator Center, CA (USA)). Oct 1982. Contract AC03-76SF00515. 21p. (CONF-8210123—1). NTIS, PC A02/MF A01. Order Number DE83007061.

From Magnetic monopole workshop; Racine, WI, USA (14 Oct 1982).

The report shows why the inadequacies of the standard model of elementary particles impel some theorists toward embedding the strong, weak and electromagnetic interactions in a simple GUT group, and explains why the grand unification scale and hence the GUM (Grand Unified Monopoles) mass are expected to be so large ($\geqq 10^{14}$ GeV). It goes on to describe some model GUTs, notably minimal SU(5) and supersymmetric (susy) GUTs. The grand unified analogues of generalized Cabibbo mixing angles are introduced relevant to the prediction of baryon decay modes in different theories as well as to the Decay modes catalyzed by GUMs. Phenomenologies of conventional and susy GUTs are contrasted including the potential increase in the grand unification scale as well as possible different baryon decay modes in susy GUTs. The phenomenology of GUMs is discussed, principally their ability to catalyze baryon decays. Some of the astrophysical and cosmological constraints on GUMs, GUMs, which make it difficult to imagine ever seeing a GUM and may impose serious restrictions on GUT model-building via their behavior in the very early universe are introduced. Finally, the reasons why GUMs are crucial aspects and tests of GUTs are summarized.

22303 (SLAC-PUB—3015) **Quark-antiquark bound-state spectroscopy and QCD.** Bloom, E.D. (Stanford Linear Accelerator Center, CA (USA)). Nov 1982. Contract AC03-76SF00515. 39p. (CONF-820709—3). NTIS, PC A03/MF A01. Order Number DE83007062.

From SLAC summer institute on particle physics; Stanford, CA, USA (17 Jul 1982).

The discussion covers quarks as we know them, the classification of ordinary mesons in terms of constituent quarks, hidden charm states and charmed mesons, bottom quarks, positronium as a model for quarti q, quantum chromodynamics and its foundation in experiment, the charmonium model, the mass of states, fine structure and hyperfine structure, classification, widths of states, rate and multipolarity of gamma transitions, questions about bottom, leptonic widths and the determination of Q/sub b/, the mass splitting of the n^3S_1 states, the center of gravity of the masses of the n^3P_j states, n^3 P_j fine structure and classification, branching ratios for upsilon′ → tau chi/sub 6j/ and the tau cascade reactions, hyperfine splitting, and top. (GHT)

22304 **(K^-,K^+) reaction and the dibaryon H.** Aerts, A.T.M.; Dover, C.B. (Brookhaven National Laboratory, Upton, New York 11973). *Physical Review Letters;* **49**: No. 24, 1752-1755(13 Dec 1982). Contract AC02-76CH00016.

Cross sections are estimated for the reaction ^3He $(K^-,K^+n)H$. This process affords a promising way of producing the stable six-quark dibaryon H (0^+,I = 0, strangeness -2) predicted by the bag model.

22305 **Perturbative QCD and weak asymmetries in lepton pair production.** Callaway, D.J.E. (High Energy Division, Argonne National Laboratory, Argonne, Illinois 60439). *Annals of Physics (New York);* **144**: No. 2, 282-344(Dec 1982).

The interference of electromagnetic and weak production mechanisms for lepton pair production may give rise to several effects which violate parity and charge symmetry. These effects are generally of the order of 1% for dilepton masses of 10 GeV. The theoretical calculations presented here show that experimental studies of these asymmetries may be useful. In particular, measurements of these asymmetries in collisions of pions with polarized protons may lead to a greatly enhanced understanding of the polarization distribution of quarks in a polarized proton. The polarization structure of d quark is shown to be of the special interest. Measurement of the parity-violating asymmetries in proton-polarized proton collisions may prove to be a sensitive probe of the flavor symmetry of the proton antiquark sea. Analysis of the parity conserving charge asymmetry (which is predicted to occur in collisions of unpolarized hadrons) allows a unique further test of the Dree—Yan model for lepton pair production, as well as of our understanding of weak interactions.

22306 **Fixed angle elastic scattering and the chromo-Coulomb phase shift.** Pire, B. (McGill Univ., Montreal, Quebec (Canada). Dept. of Physics); Ralston, J.P. (McGill Univ., Montreal, Quebec (Canada). Dept. of Physics; Argonne National Lab., IL (USA). High Energy Physics Div.). *Physics Letters,* [*Section*] *B;* **117**: No. 3/4, 233-237(11 Nov 1982).

The Sudakov-corrected Landshoff contributions to fixed angle elastic scattering are examined in perturbative QCD. We emphasize two aspects: the asymptotic power behaviour and the presence of imaginary parts of Sudakov corrections. The second effect, called the chromo-Coulomb phase shift, can introduce an oscillatory component with roughly logarithmic argument. This conclusion is in striking agreement with data for pp elastic scattering at 90^0 and medium energy.

22307 **Parity violation in pion electroproduction and photoproduction with a proton target.** Li, S.; Henley, E.M.; Hwang, W.P. (Institute for Nuclear Theory, Department of Physics, FM-15, University of Washington, Seattle, Washington 98195). *Annals of Physics (New York);* **143**: No. 2, 372-412(15 Oct 1982).

Parity violation in pion electroproduction and photoproduction in a proton target investigated as a possible means of elucidating the structure of the electronic and non-leptonic neutral weak currents. We calculate both parity-violating effects caused directly by Z-boson exchange, which contributes only to electron scattering, and those due to parity-violating electromagnetic and nuclear interactions. The asymmetry in electroproduction is of order 10^{-5}, whereas that in photoproduction is $\sim 10^{-7}$. The sensitivity to the parameter $\sin^2 \theta$/sub W/ is investigated; it is a maximum at backward electron scattering angles. In addition to the Born terms, contributions from the $\Delta(1232)$ resonance and the light vector mesons [rho(776) and $\omega(782)$] are included in the model. Fits to the observed π^0 and π^+ electroproduction and photoproduction cross sections indicate that the model accounts for production data in the medium energy region.

22308 **Hunting for the selectron.** Gaillard, M.K.; Hall, L. (California Univ., Berkeley (USA). Lawrence Berkeley Lab.; California Univ., Berkeley (USA). Dept. of Physics); Hinchliffe, I. (California Univ., Berkeley (USA). Lawrence Berkeley Lab.). *Physics Letters,* [*Section*] *B;* **116**: No. 4, 279-282(14 Oct 1982).

The cross section for single selectron production in e^+e^- collisions is calculated, and the distribution of its decay esup(+-) is given. Observation of this energetic esup(+-) would provide the first experimental support for models of low energy supersymmetry; its absence puts a lower limit on the selectron mass in excess of the beam energy.

22309 **Finite size scaling and low mass glueballs.** Brower, R.C. (California Univ., Santa Cruz (USA). Physics Dept.); Creutz, M. (Brookhaven National Lab., Upton, NY (USA)); Nauenberg, M. (California Univ., Santa Barbara (USA). Inst. for Theoretical Physics). *Nuclear Physics* [*Section*] *B;* **210**: No. 2, 133-141(27 Sep 1982).

We propose finite lattice effects as a probe of the glueball mass spectrum, and give an analysis of the recent SU(2) Monte Carlo data of Brower, Nauenberg and Schalk in terms of a gas of free glueballs. For L^4 lattices with $L = 4, 5, 6$ fits are made to xi(m = 1/axi) which indicate a rather large effective number of degrees of freedom (i.e. statistical degeneracy where a spin J counts as 2J + 1) from 5 to 15 states. As the degeneracy is increased, the central glueball mass increases from $m = (1.3 +- 0.2)\sqrt{K}$ at degeneracy 5 to about $m = (1.9 +- 0.2)\sqrt{K}$ at degeneracy 15, relative to the SU(2) string tension $\sqrt{K}$.

22310 **Symmetry constraints in optimal polarization formalisms with an application to p-p scattering*.** Goldstein, G.R.; Moravcsik, M.J. (Department of Physics, Tufts University, Medford, Massachusetts 02155). *Annals of Physics (New York);* **142**: No. 2, 219-283(Sep 1982).

The paper contains results (a) for the general optimal polarization formalism with constraints from time reversal invariance, identical particles, and parity conservation, (b) for the specific reaction involving four spin-1/2 particles, (c) for the application of the formalism to elastic p-p scattering at 6 GeV/c and at 800 MeV. The choice of the orientation axes under various symmetry constraints is discussed for the general optimal formalism, showing the narrowing of the choices which nevertheless retains an infinite continuum of possibilities. The transformation properties of amplitudes among these various optimal frames are specified. The transformation of observables among these frames is also discussed for the reaction with four spin-1/2 particles. Then the relationship between the observables and the bilinear combination of amplitudes is given for the reaction which four spin-1/2 particles, for the constraints of identical particles, identical particles and time reversal invariance, and identical particles and time reversal invariance and parity conservation. The results are applied to the analysis of the Argonne data at GeV/c, $t = -0.6$ GeV^2/c^2, for elastic p-p scattering. The amplitudes are easily determined when the proper optimal frame is used, and the display of the amplitudes in other optimal frames suggest some features that may be significant in searching for dynamics. Another application is presented to 800 MeV elastic p-p scattering at several angles, showing that in the proper optimal frame very accurate results can be obtained about a subset of amplitude parameters on the basis of an incomplete set of data. Such an analysis is shown to be helpful in the design of future experiments.

22311 **Theory of hadron-deuteron elastic scattering in the GeV region.** Alberi, G.; Bleszynski, M.; Jaroszewicz, T. (Instituto di Fisica Teorica, Universita di Trieste, Miramare, Trieste, Italy). *Annals of Physics (New York);* **142**: No. 2, 299-358(Sep 1982).

A multiple scattering formalism for the medium energy hadron-deuteron elastic scattering is developed. This approach provides an extension of the Glauber theory incorporating the complete spin structure and the corrections to the eikonal and fixed scatterer approximations. The systematics of the spin observables and their relation to the hadron-deuteron as well as to hadron-nucleon amplitudes are discussed. An approximate cancellation between few corrections to the double scattering term is found which leaves the non-eikonal correction as the dominant one, and often, very important numerically, e.g., in the deuteron tensor polarization. Comparison of the parameter-free predictions of the theory based on the recent NN phase shift amplitudes with the data on polarization observables in pd elastic scattering is made.

22312 **Proton decay in supersymmetric models.** Dimopoulos, S. (Michigan Univ., Ann Arbor (USA). Dept. of Physics; Stanford Univ., CA (USA). Dept. of Physics); Raby, S. (Los Alamos National Lab., NM (USA)); Wilczek, F. (California Univ., Santa Barbara (USA). Inst. for Theoretical Physics). *Physics Letters,* [*Section*] *B;* **112**: No. 2, 133-136(6 May 1982).

We discuss proton decay in supersymmetric theories. We find that it is possible to obtain rates which are comparable with those of standard SU(5). In the presence of a discrete symmetry which occurs in an SU(5) supersymmetric unified model we obtain a definite prediction for the dominant decay mode, i.e. p → K^+ anti νsub(μ) and n → K^0anti νsub(μ).

22313 **Physics of intermediate vector bosons.** Ellis, J.; Gaillard, M.K.; Girardi, G.; Sorba, P. (CERN, Geneva, Switzerland). *Annual Review of Nuclear Science;* **32**: No. 1, 443-497(1982). Contract W-7405-ENG-48.

The properties and possible production Z^0 are reviewed. (AIP)

22314 **Charged-current neutrino interactions.** Fisk, H.E.; Sciulli, F. (Fermilab, Batavia, Illinois 60510). *Annual Review of Nuclear Science;* **32**: No. 1, 499-573(1982).

Deep inelastic νN interactions are reviewed. Quark model predictions are given and structure functions analyzed. (AIP)

6453 Particle Invariance Principles And Symmetries

REFER ALSO TO CITATION(S) 22295, 22310, 22323, 22585, 22586

22315 (LA—9572-C-Vol.1, pp 106-114) **CP violation.** Cronin, J.W. (Univ. of Chicago, IL). Nov 1982. NTIS, PC A18/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

Eighteen years have passed since the discovery of CP violation. In this period of time many beautiful experiments have been carried out. The result of all these experiments is the conclusion that CP violation can be accounted for by a single number. We briefly review the present situation and indicate the most promising future experiments, some of which may be appropriate to consider for LAMPF II.

22316 (LA—9572-C-Vol.1, pp 156-170) **Lepton flavor nonconservation.** Rosen, P. (Purdue Univ., Lafayette, IN). Nov 1982. NTIS, PC A18/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

Interest in lepton flavor nonconservation has grown in the past three years because it provides a signal for the existence of hitherto unobserved heavy particles, and for the grand unification of strong and electro-weak interactions. Heavy particles which may be associated with the violation of lepton flavor include: heavy leptons, especially neutral ones; new multiplets of Higgs scalars in addition to the one needed for the minimal Glashow-Weinberg-Salam model of electro-weak interactions; or new kinds of gauge vector bosons which transmit the horizontal symmetries between the various families of leptons and quarks. This something new aspect of the subject applies particularly to charged lepton processes like $\mu \rightarrow e\gamma$.

22317 (LA—9572-C-Vol.2, pp 406-408) **Report of the CP-violation working group.** Hoffman, C.M. (Los Alamos National Lab., NM). Nov 1982. NTIS, PC A17/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

The CP-Violation Working Group met twice during the workshop. A nice summary of our present knowledge of CP-violation was presented in the talk by Prof. James W. Cronin. In the final paragraph of his talk, Prof. Cronin argues that higher precision experiments studying CP-violation at LAMPF II will be extremely important no matter what additional knowledge we acquire in the time before LAMPF II is constructed. The crucial issue at present is to uncover the underlying mechanism responsible for CP-violation. The Working Group heard several talks aimed at reviewing the theoretical status of CP-violation and the directions that future experimental efforts might take. These talks included: Kaon Experiments at KEK, T. Yamazaki, University of Tokyo; Mechanisms for CP Violation, P. Herczeg, Los Alamos; and The Experimental Status of eta$_{00}$ Experiments, J.W. Cronin, Univ. of Chicago. There were also extended discussions on which experiments appear to be the most important and how to best perform these measurements. A summary of these discussions is given.

22318 **Breaking of supersymmetry at intermediate energy.** Polchinski, J.; Susskind, L. (Stanford Linear Accelerator Center, Stanford University, Stanford, California 94305). *Physical Review [Section] D: Particles and Fields;* **26**: No. 12, 3661-3673(15 Dec 1982). Contract AC03-76SF00515.

We consider the proposal that supersymmetry is broken at a scale μ midway between the Planck scale M and the usual weak scale. We show how a phenomenological explicitly softly broken supersymmetric theory can emerge below scale μ. The characteristic scale for the explicit supersymmetry breaking is of order $\alpha\mu^2$/M. Identifying this with the weak scale ~250 GeV gives $\mu \sim 10^{12}$ GeV.

22319 **Composite models of quarks and leptons and strong-coupling lattice gauge theories.** Quinn, H.R.; Drell, S.D.; Gupta, S. (Stanford Linear Accelerator Center, Stanford University, Stanford, California 94305). *Physical Review [Section] D: Particles and Fields;* **26**: No. 12, 3689-3700(15 Dec 1982). Contract AC03-76SF00515.

We extend a previous variational block-spin analysis of the realization of chiral symmetry in a strong-coupling lattice gauge theory to models which have been suggested as possibly describing massless composite fermions. In all cases we find massive fermion composites and spontaneous breaking of chiral symmetry. We also discuss the relevance of this result to the continuum limit.

6454 Field Theory

REFER ALSO TO CITATION(S) 22318, 22319

22320 (SLAC-PUB—2966) **Breakdown of QCD factorization theorems for inclusive reactions.** Brodsky, S.J.; Bodwin, G.T.; Lepage, G.P. (Stanford Linear Accelerator Center, CA (USA); Cornell Univ., Ithaca, NY (USA). Lab. of Nuclear Studies). Aug 1982. Contract AC03-76SF00515. 5p. (CONF-8206117—4). NTIS, PC A02/MF A01. Order Number DE83007007.

From 13. international symposium on multiparticle dynamics; Volendam, Netherlands (6 Jun 1982).

Initial state interactions are shown to violate standard factorization for massive lepton pair production and hadron-induced hard-scattering inclusive reactions order-by-order in QCD perturbation theory. Initial and final state interactions lead to a number of new physical phenomena including K_1 fluctuations, color correlations, anomalous nuclear number dependence of inclusive cross sections, and induced hadron production in the central rapidity region.

22321 (SLAC-PUB—3006) **GUTs and supersymmetric GUTs in the very early universe.** Ellis, J. (Stanford Linear Accelerator Center, CA (USA)). Oct 1982. Contract AC03-76SF00515. 14p. (CONF-8206156—1). NTIS, PC A02/MF A01. Order Number DE83007018.

From Nuffield workshop on the very early universe; Cambridge, UK (21 Jun 1982).

This talk is intended as background material for many of the other talks treating the possible applications of GUTs to the very early universe. I start with a review of the present theoretical and phenomenological status of GUTs before going on to raise some new issues for their prospective cosmological applications which arise in supersymmetric (susy) GUTs. The first section is an update on conventional GUTs, which is followed by a reminder of some of the motivations for going supersymmetric. There then follows a simple primer on susy and a discussion of the structure and phenomenology of simple sysy GUTs. Finally we come to the cosmological issues, including problems arising from the degeneracy of susy minima, baryosynthesis and supersymmetric inflation, the possibility that gravity is an essential complication in constructing susy GUTs and discussing their cosmology, and the related question of what mass range is allowed for the gravitino. Several parts of this write-up contain new material which has emerged either during the Workshop or subsequently. They are included here for completeness and the convenience of the prospective reader. Wherever possible, these anachronisms will be flagged so as to keep straight the historical record.

22322 Classical and quantal Liouville field theory. D'Hoker, E.; Jackiw, R. (Center for Theoretical Physics, Laboratory for Nuclear Science and Department of Physics, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139). *Physical Review [Section] D: Particles and Fields;* **26**: No. 12, 3517-3542(15 Dec 1982). Contract AC02-76ER03069.

The canonical structure of the Liouville theory is investigated. We present two canonical transformations which map the theory onto a free field theory. The first makes use of conformal invariance and relies on a Yang-Feldman solution to the field equation. The second employs the inverse scattering method, which is uncommonly intricate, owing to the conformal invariance. We also analyze the quantized theory. Semiclassical arguments, supplemented by a study of the exact effective potential, suggest that the theory has a conformally invariant, continuous energy spectrum, bounded from below, but no translationally invariant ground state.

22323 More about hidden-symmetry algebra for the self-dual Yang-Mills system. Chau, L.; Yong-Shi, W. (Physics Department, Brookhaven National Laboratory, Upton, New York 11973). *Physical Review [Section] D: Particles and Fields;* **26**: No. 12, 3581-3592(15 Dec 1982).

The infinite-parameter "hidden symmetry" algebra for the complex self-dual SU(N) Yang-Mills fields is extended from SL(N,C)xC[λ] to SL(N,C)xC[λ,λ^{-1}]direct-sumSL(N, C). Furthermore, we also find an infinite set of infinitesimal "hidden symmetry" transformations, indexed by all integers, which can maintain the reality of the self-dual Yang-Mills potentials. Their infinite-parameter Lie algebra is shown to be related to an infinite-dimensional symmetric space with isotropy group SU(N)xR[λ].

22324 Consequences of a monopole with Dirac magnetic charge. Lazarides, G.; Shafi, Q.; Trower, W.P. (Department of Physics, Rockefeller University, New York, New York 10021). *Physical Review Letters;* **49**: No. 24, 1756-1758(13 Dec 1982). Contract AC02-81ER40033.

The discovery of a monopole with Dirac magnetic charge, $e/2\alpha$, would imply absolute quark confinement and forbid any free, fractional electrically charged particles, if no unknown long-range forces exist. Further, unification of electromagnetism and quantum chromodynamics would be required. The monopole also carries screened color magnetic fields. Certain alternatives to QCD in which the SU(3) gauge symmetry is broken, partially or completely, are excluded. The inflationary universe scenario based on SU(5) grand unified theory would be excluded.

22325 Ferromagnetic Ising model in noninteger spatial dimension. Baker, G.A. Jr.; Benofy, L.P. (Theoretical Division, Los Alamos National Laboratory, University of California, Los Alamos, New Mexico 87545.). *Journal of Statistical Physics;* **29**: No. 4, 699-779(Dec 1982).

Using the necessary and sufficient conditions in terms of the high-field series coefficients that the Yang-Lee theorem holds, we prove rigorously by counterexample that it cannot be extended to general noninteger dimension, when such models are defined by the "natural" analytic continuation.

22326 Glueball states in reduced large-N Hamiltonians. Levine, H.; Neuberger, H. (Schlumberger-Doll Research, Ridgefield, Connecticut 06877). *Physical Review Letters;* **49**: No. 22, 1603-1605(29 Nov 1982). Contract AC02-76ER02220.

It is shown that the reduced large-N/sub c/ Hamiltonian can reproduce not only the Wilson-loop expectation values but also the glueball spectrum of the infinite-volume lattice gauge theory. With the addition of fermions, the resulting quantum matrix model can potentially be used to calculate a large set of strong-interaction features.

22327 Neutral current phenomenology of supersymmetric SU(2) x U(1) x anti U(1) models. Kang, Y.S. (California Univ., Berkeley (USA). Lawrence Berkeley Lab.; California Univ., Berkeley (USA). Dept. of Physics). *Physics Letters, [Section] B;* **117**: No. 5, 312-316(18 Nov 1982).

The neutral current sector of a class of supersymmetric SU(2) x U(1) x U tilde(1) models is parametrized. Bounds on the neutral boson masses are obtained from the low energy data, and the implications of future experimental findings for these models are discussed.

22328 Solving phi^{4}sub(1,2) field theory with Monte Carlo. Cooper, F.; Freedman, B.; Preston, D. (Los Alamos National Lab., NM (USA). Theoretical Div.). *Nuclear Physics [Section] B;* **210**: No. 2, 210-228(27 Sep 1982).

We study lattice g_0PHI^4 field theory for all g_0 and fixed renormalized mass M in one and two dimensions using Monte Carlo techniques. We calculate the dimensionless renormalized coupling constant anti gsub(R) = gsub(R)/Msup(4-d), where d is the dimension of space-time, at fixed small values of the lattice spacing a for various g_0 and lattice sizes. Our results are in quantitative agreement with the analyses of high temperature and strong coupling series which rely on extrapolation from large to small lattice spacing.

22329 Cosmological bounds on a left-right symmetric model. Huerta, R. (Fermi National Accelerator Lab., Batavia, IL (USA)). *Nuclear Physics [Section] B;* **204**: No. 3, 413-418(20 Sep 1982).

The right-handed neutrino cross sections of the processes νsub(L) + l → νsub(R) + l and νsub(R) + l → νsub(R) + l, where l is a relativistic lepton, are calculated in the SU(2)sub(L) x SU(2)sub(R) x U(1) model. According to a cosmological criterion the parameters of the model are bounded. In particular we obtain the bound Msub(WR) approx. >= 30 Msub(WL), assuming the neutrinos are Dirac four-component particles.

22330 Four families of composite quarks and leptons. Albright, C.H. (Fermi National Accelerator Lab., Batavia, IL (USA); Northern Illinois Univ., De Kalb (USA). Dept. of Physics); Schremp, B.; Schremp, F. (Hamburg Univ. (Germany, F.R.). 2. Inst. fuer Theoretische Physik). *Physics Letters, [Section] B;* **113**: No. 3, 225-230(17 Jun 1982).

Four families of composite quarks and leptons, two standard and two non-standard, are found in a unique solution SU(3)sub(HC) x SU(6)sub(L) x SU(6)sub(R) of a restricted 't Hooft anomaly-matching program. Testable predictions emerge, such as prohibition of $\mu \rightarrow e\gamma$, zero charge asymmetry in $e^+e^- \rightarrow$ rho$^+$ tau$^-$ in contrast to $e^+e^- \rightarrow \mu^+\mu^-$, and a rich new hadron spectrum masses around Msub(W). A minimal set of spectator fermions contains color-singlet objects with fractional quark-like charges.

22331 Simple viable models of low-energy supersymmetry. Hall, L.J. (California Univ., Berkeley (USA). Dept. of Physics); Hinchliffe, I. (California Univ., Berkeley (USA). Lawrence Berkeley Lab.). *Physics Letters, [Section] B;* **112**: No. 4/5, 351-355(20 May 1982).

Necessary conditions are established which must be satisfied by models of low-energy supersymmetry if they are to be phenomenologically acceptable at the tree level. These conditions enable one to solve the longstanding problem of giving the scalar partners of quarks and leptons large masses in such renormalizable models. A specific model is written down.

22332 What can we count on? A discussion of constituent-counting rules for interactions involving composite systems. Sivers, D. (Argonne National Laboratory, Argonne, Illinois 60439). *Annual Review of Nuclear Science;* **32**: No. 1, 149-175(1982).

QCD predictions for hadronic form factors and fixed-angle scattering are derived. (AIP)

22333 Solitons in one-dimensional charge density wave systems. Su, W.P. Philadelphia, PA; Pennsylvania Univ. (1981). 213p. University Microfilms Order No. 81-27,079.

Thesis.

Theoretical research on one dimensional charge density wave systems is outlined. A simple coupled electron-photon Hamiltonian is studied including a Green's function approach, molecular dynamics, and Monte Carlo path integral method. As in superconductivity, the nonperturbative nature of the system makes the physical ground states and low energy excitations drastically different from the bare electrons and phonons. Solitons carry quantum numbers which are entirely different from those of the bare electrons and holes. The fractional charge character of the solitons is an example of this fact. Solitons are conveniently generated by doping material with donors or acceptors or by photon absorption. Most predictions of the theory are in qualitative agreement with experiments. The one dimensional charge density wave system has potential technological importance and a possible role in uncovering phenomena which might have implications in relativistic field theory and elementary particle physics.

6455 Scattering Theory

REFER ALSO TO CITATION(S) 22683

22334 **(ANL/NESC—920) DEVOG; coupled molecular scattering equations.** Thomas, L.D. (Lawrence Berkeley Lab., CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048920.

The number of coupled equations which can be solved depends on the amount of main memory available.

DEVOG solves the coupled, second-order differential equations of atomic and molecular quantum scattering theory. The program is independent of the chemical system or the method (close coupling, coupled states, etc.). The physical problem is defined by user-supplied subroutines, POT and LIST.CDC7600,CYBER175; FORTRAN IV; SCOPE 2.1 (CDC7600), NOS 1.3 (CDC CYBER175); 144,000 (octal) words of memory are required to execute the sample problem.

22335 **(ANL/NESC—921) PC; coupled molecular scattering equations.** Thomas, L.D. (Lawrence Berkeley Lab., CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048921.

The number of coupled equations which can be solved depends on the amount of main memory available.

PC solves the coupled, second-order differential equations of atomic and molecular quantum scattering theory. The program is independent of the chemical system or the method (close coupling, coupled states, etc.). The physical problem is defined by user-supplied subroutines, POT and LIST.CDC7600,CYBER175; FORTRAN IV; SCOPE 2.1 (CDC7600), NOS 1.3 (CDC CYBER175); 143,000 (octal) words of memory are required to execute the sample problem.

22336 **(ANL/NESC—928) TDELAY; scattering phase shifts & time delays.** Le Roy, R.J. (Waterloo Univ., Ontario (Canada)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048928.

Maxima of - 6001 potentials 6001 mesh points.

TDELAY solves the radial or one-dimensional Schroedinger equation for any given (smooth) potential in the continuum of energies above its "dissociation threshold" to determine the scattering phase shift and collisional time delay associated with any given energy and partial wave (angular momentum state). If desired, TDELAY will also automatically locate and determine the width of orbiting, or shape, resonances defined by local maxima of the collisional time delay as a function of energy.IBM370,303x;CDC7600,CYBER175; FORTRAN IV; OS/370 (IBM370), SCOPE 2.1 (CDC7600), NOS 1.3 (CDC CYBER175); 190K bytes of memory are required to execute the IBM370 version of TDELAY; the CDC7600 version requires 60,000 (octal) words.

22337 **(ANL/NESC—940) INSCAT; inelastic scattering method.** Redmon, M.J. (Chemical Dynamics Corp., Columbus, OH (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048940.

Maximum of - 25 channels with the program's current dimensioning.

INSCAT solves the coupled, second-order differential equations of atomic and molecular quantum scattering theory.CDC7600,CYBER175; FORTRAN IV; SCOPE 2.1 (CDC7600), NOS 1.3 (CDC CYBER175); 113,000 (octal) words of memory are required to execute the sample problem.

22338 **(ANL/NESC—941) LOGD; multichannel log-derivative scattering.** Johnson, B.R. (Aerospace Corp., Los Angeles, CA (USA). Chemistry and Physics Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048941.

Maximum of - 10 coupled channels.

LOGD solves the close-coupled, Schroedinger equation of quantum scattering theory. An option for using a multi-channel WKB approximation is included in the program.CDC7600,CYBER175; FORTRAN IV; SCOPE 2.1 (CDC7600), NOS 1.3 (CDC CYBER175); 102,000 (octal) words of memory are required to execute the sample problem.

22339 **(ANL/NESC—942) MNN; solution of close coupling equations.** Truhlar, D.G.; Thirumalai, D. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048942.

The number of coupled equations which can be solved depends on the amount of main memory available.

MNN solves the coupled differential equations of the coupled-channel method for the quantum mechanical treatment of inelastic collisions of electrons, atoms, and molecules.CDC7600,CYBER175,74; FORTRAN IV; SCOPE 2.1 (CDC7600), NOS 1.3 (CDC CYBER175,74); 134,000 (octal) words of memory are required to execute the sample problem.

22340 **(ANL/NESC—945) KAPPAS; semiclassical transmission probability.** Truhlar, D.G. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048945.

The potential function, which is user-supplied, must tend to zero as x approaches negative infinity and have a single maximum located at $x=0$.

KAPPAS computes semiclassical transmission probabilities for a one-dimensional potential energy barrier and thermally averages them to obtain transmission coefficients. The error caused by use of the semiclassical approximation as compared to quantum mechanics is generally ten percent or less for typical potential energy barriers representing chemical reactions.CDC7600,CYBER74,175; FORTRAN IV; SCOPE 2.1 (CDC7600), NOS 1.3 (CDC CYBER74,175); 16,000 (octal) words of memory are required to execute the sample problem.

65 PHYSICS RESEARCH

6510 Nuclear Physics

REFER ALSO TO CITATION(S) 22248, 22408

22341 **(ANL/NESC—447) ETOG1 Data for MUFT and GAM Libraries; MUFT4 or 5, GAM1 or 2.** Kellman, S.; Kusner, D.E. (Westinghouse Electric Corp., Pittsburgh, PA (USA). PWR Systems Div.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048447.

Library No. of groups GAM1 68 GAM2 99 MUFT4,5 54 A 1/E weighting function joined to the fission spectrum was used. A 1.0*10**7 value was used as the non-resonance potential scattering cross section per absorber atom. For MUFT libraries the 26th group was the lowest group number in the resonance region, the 25th group was the highest in the inelastic region.; MUFT4 (1 tape-7,414 cards) MUFT5 (1 tape-10,438 cards) GAM1 (1 tape-15,393 cards) GAM2 (2 tapes TAPE1-16,936 cards, TAPE2-20,034 cards) Reference report * variable number of 80-character records per file.

The data required for the creation of MUFT4, MUFT5, GAM1, and GAM2 libraries were generated from the Brookhaven National Nuclear Data Center ENDF/B tapes 114 through 117 by the ETOG1 program.CDC6600.

22342 **(BNL-NCS—51635) Review of Panel on Reference Nuclear Data surveys and discussions on reference nuclear data needs.** Burrows, T.W. (Brookhaven National Lab., Upton, NY (USA)). Oct 1982. Contract AC02-76CH00016. 16p. NTIS, PC A02/MF A01. Order Number DE83008473.

The results of the six meetings in the years 1976 through 1981 of the Panel on Reference Nuclear Data is reviewed, as well as the results of other studies and workshops. A brief review of how current programs are meeting the expressed nuclear data needs of professional groups is also presented. The types of data included in the review are reaction cross sections, isotopic abundances, atomic masses, nuclear structure, radioactive decay, and fission.

22343 **(DOE/ER/04936—8) Nuclear spectroscopic studies. Progress report, June 1, 1982-May 31, 1983.** Bingham, C.R.; Guidry, M.W.; Riedinger, L.L. (Tennessee Univ., Knoxville (USA). Dept. of Physics and Astronomy). 28 Feb 1983. Contract AS05-76ER04936. 72p. NTIS, PC A04/MF A01. Order Number DE83008192.

Activities of the Nuclear Physics Group at the University of Tennessee are reported. Recent accomplishments and results are described under the headings: properties of high spin states, nuclear structure from heavy ion reactions, UNISOR studies, theory, and developmental activities. Organizational activities are described, and publications and invited talks are listed. (WHK)

22344 **(DOE/ER/40016—T1) Technical progress report.** (Colorado Univ., Boulder (USA). Nuclear Physics Lab.). 1 Oct 1982. Contract AC02-81ER40016. 62p. (NPL—936). NTIS, PC A04/MF A01. Order Number DE83000719.

This report summarizes the work carried out by personnel at the Nuclear Physics Laboratory of the University of Colorado from about August 1, 1981 to October 1, 1982, under contract with the Department of Energy. The intermediate energy studies summarized in this report were carried out at the meson physics facilities at Los Alamos (LAMPF), the cyclotron at Indiana University (IUCF), and the meson physics facilities at Vancouver (TRIUMF). This year, for the first time, intermediate energy experimental studies are being reported in separate documents from the low energy and theoretical nuclear physics efforts. Experimental studies are reported on pion-nucleus interactions, charge exchange reactions, nucleon transfer reactions, and apparatus development.

22345 (LA—9572-C-Vol.1, pp 282-288) **Report of the nuclear physics working group.** Stein, N. (Los Alamos National Lab., NM); Hintz, N. Nov 1982. NTIS, PC A18/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

The Nuclear Physics Working Group met during two afternoon sessions of the Workshop to discuss the opportunities and directions for nuclear physics research that will be offered by LAMPF II. Principal topics of discussion were hypernuclear physics, double strangeness exchange and the nuclear response to the mesonic probes, K and π, and the baryonic probes p and anti p at LAMPF II energies. The final session was capped by a roundtable discussion on New Directions in the Microscopic Description of Nuclei Offered by LAMPF II. The Working Group report and summary is presented as prepared by the chairmen.

22346 (LA—9572-C-Vol.2, pp 648-657) **Summary report of the LAMPF II nuclear chemistry working group.** Dropesky, B.J. (Los Alamos National Lab., NM). Nov 1982. NTIS, PC A17/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

The prospect of having relatively high-intensity beams of kaons, antiprotons, and high-energy pions and protons from LAMPF II opens up some exciting avenues of research by the nuclear chemistry community. Beams of kaons and antiprotons of adequate intensity and purity have not been available heretofore to carry out definitive activation studies of the interaction of these probes with complex nuclei. Such studies will therefore be discussed first. Extension of our present investigations into pion-induced nuclear reactions to higher energies and the utilization of multi-GeV protons at substantial intensities for producing new nuclei far from stability will then be discussed.

22347 **(UCID—18987-83) Report to the DOE Nuclear Data Committee, 1983.** Haight, R.C.; Struble, G.L. (Lawrence Livermore National Lab., CA (USA)). Feb 1983. Contract W-7405-ENG-48. 16p. NTIS, PC A02/MF A01. Order Number DE83008295.

Measurements for nuclear data applicactions are described including branching ratio in ^{7}Be decay, kerma factor for carbon, photoneutron cross sections, neutron differential scattering cross sections, half-life of ^{77}Kr, stellar neutron capture rates for ^{86} ^{87} ^{88}Sr, neutron total cross sections, ^{142} ^{143} ^{144}Nd neutron capture nucleosynthesis, half-life of ^{163}Ho, thermal neutron fission of ^{236}Np, revised branching ratios in ^{237}U and ^{238}Pu decays, and levels of ^{244}Cm populated by the beta decay of 10-hour ^{244}Am and 26-minute /sup 244m/Am. Calculations discussed include systematic test of microscopic optical models for nucleon scattering in the range 7 to 60 MeV, Lanczos method shell-model calculations of GamowTeller strength functions, explosive nucleosynthesis and direct radiative capture rates, and calculation of fission cross sections. Evaluated data libraries are briefly discussed. (WHK)

6511 Experimental Techniques

22348 **(ANL/NESC—333) TOAD; processing of analyzer gamma-ray spectra.** Busch, D.D. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048333.

TOAD will handle up to 100 spectra at a time from analyzers with 4096 channels or fewer.

TOAD is used to process and analyze gamma ray spectra.UNIVAC1108; FORTRAN IV and Assembly language; EXEC2, GAX33; 32K memory.

22349 **(ANL/NESC—475) CRECT;CHECKER;RIGEL;PLOTFB; LISTFC;DICTION;SLAVE3;DAMMET ENDF/B V2 processing codes.** Ozer, O. (Brookhaven National Lab., Upton, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048475.

This package of eight programs is designed for processing ENDF/B II (Evaluated Nuclear Data File Version B Format II) tapes. CRECT, which processes Version III ENDF/B data as well as earlier versions, provides a means of correcting assembled data on a tape by insertion and deletion of data. CHECKER checks that the ENDF/B BCD card image format tapes are in proper format and all fields are within specified limits, rather than the physics of the data library. Angular distributions reconstructed from Legendre coefficients are checked to ensure they are everywhere positive. RIGEL will perform any or all of the following operations - selectively retrieve ENDF/B data on from 1 to 9 ENDF/B tapes, merge retrieved ENDF/B data onto from 1 to 8 ENDF/B result tapes, change tape arrangement (from standard to alternate or vice versa) and change tape mode. LISTFC, which processes Version III ENDF/B data as well as earlier versions, produces interpreted listings of information from BCD standard arrangement ENDF/B tapes. DICTION constructs a new section dictionary (file 1, section 451) for an entire ENDF/B tape. If a section dictionary is already present it is replaced. PLOTFB processes ENDF/B library tapes which contain data embedded within a necessary library structure in order to produce comprehensive listings and/or plots.

6512 Nuclear Properties And Reactions, A=1-5

REFER ALSO TO CITATION(S) 22188

22350 **(GSI—82-9) Nucleus fragmentation induced by a high - energy hadron some experimental results. Pt. 3.** Zielinski, P. (Gesellschaft fuer Schwerionenforschung m.b.H., Darmstadt (Germany, F.R.)). Aug 1982. 27p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750186.

The author has measured the differential cross sections for the proton-deuteron breakup reaction as a function of the excitation energy of the pp system. The results are discussed in the context of the study of more complex reactions.

6513 Nuclear Properties And Reactions, A=6-19

REFER ALSO TO CITATION(S) 22415

22351 **(CONF-820828—8) Nuclear structure in pion scattering and charge exchange.** Zeidman, B.; Geesaman, D.F. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 18p. NTIS, PC A02/MF A01. Order Number DE83007945.

From 9. EPS Nuclear Physics Divisional conference on nuclear structure; Amsterdam, Netherlands (29 Aug 1982).

Data from pion inelastic scattering and charge-exchange experiments are discussed within the framework of a DWIA analysis. The properties of the pion-nucleon interaction transformed to the pion-nuclear system are used to infer new nuclear-structure information for both discrete states and giant resonances.

22352 **(DOE/NBM—3007675) Beta decay rate of ^{16}N(0^-, 120 keV): meson exchange currents and the value of the induced pseudoscalar-coupling constant.** Gagliardi, C.A. III. (Princeton Univ., NJ (USA). Dept. of Physics). Oct 1982. Contract W-31-109-ENG-38. 124p. NTIS, PC A06/MF A01. Order Number DE83007675.

Thesis.

The beta-decay branching ratio R(β) for the transition ^{16}N(0^-, 120 keV) $\rightarrow$ ^{16}O (0^+, g.s.) + e^- + anti nu is remeasured. The rate of this $0^- \rightarrow 0^+$ transition $\Lambda(\beta)$ is expected to receive a large enhancement from pion-exchange-current contributions to the weak axial-vector time component. The beta-decay rate may also be combined with the muon-capture rate $\Lambda(\mu)$ for the inverse reaction μ^- + ^{16}O(0^+, g.s.) $\rightarrow$ ^{16}N(0^-, 120 keV) + nu/sub μ/ to obtain the induced pseudoscalar coupling constant g/sub P/ in finite nuclei. The experimental results are compared to recent realistic calculations of $\Lambda(\beta)$ and $\Lambda(\mu)$ in which 2-particle, 2-hole components are included in the ^{16}O ground state and 3-particle, 3-hole components are included in the ^{16}N 0^- state, while three different residual interactions are utilized to determine the wavefunctions. We find R(β) = (3.42 +- 0.37) x 10^{-6}. This agrees with the only previous measurement R(β) = (3.5 +- 0.7) x 10^{-6}. The beta-decay rate $\Lambda(\beta)$ = (0.45 +- 0.05) $\sec^{-1}$, which agrees with the calculations only when pion-exchange currents are included. The nucleons-only impulse approximation underestimates $\Lambda(\beta)$ by more than a factor of 3, independent of the residual interaction. This confirms the important role of pion exchange in the weak axial-vector time component. The measured ratio $\Lambda(\mu)/\Lambda(\beta)$ implies that g/sub P//g/sub A/ = 11 +- 2 for the nucleon in finite nuclei. This result is model dependent. It assumes that $\Lambda(\mu)/\Lambda(\beta)$ is independent of the nuclear model used in its calculation, as is approximately true in the recent calculations.

22353 **(INIS-mf—7432, pp vp) Negative pions production in nucleus-nucleus collisions at pc=4.2 GeV per nucleon.** Trka, Z.; Korbel, Z.; Trkova, J. (Karlova Univ., Prague (Czechoslovakia). Fakulta Matematicko-Fyzikalni). [nd]. (In Czech). NTIS (US Sales Only), PC A06/MF A01.

From 6. conference of Czechoslovak physicists; Ostrava, Czechoslovakia (27 Aug 1979).

22354 **Measurement of the p-C analyzing power between 100 and 750 MeV and the p-Be analyzing power at 780 MeV.** Ransome, R.D.; Hollas, C.L.; Riley, P.J. (Texas Univ., Austin (USA)); Bonner, B.E.; Cornelius, W.D.; Van Dyck, O.B.; Hoffman, E.W.; McNaughton, M.W.; York, R.L. (Los Alamos National Lab., NM (USA)); Wood, S.A. (Massachusetts Inst. of Tech., Cambridge (USA)). *Nuclear Instruments and Methods in Physics Research;* **201**: No. 2/3, 315-321(15 Oct 1982).

The inclusive p-C analyzing power has been measured for laboratory scattering angles between 4° and 25°, for energies between 100 and 750 MeV. The inclusive p-Be analyzing power has been measured at 780 MeV between 4° and 28°. The experiment was performed at LAMPF using a large solid angle polarimeter. An energy dependent empirical fit to these data as well as to data from SIN and TRIUMPF is presented. The data from all three facilities are in generally good agreement.

6514 Nuclear Properties And Reactions, A=20-38

22355 **(ANL/NESC—504) THRES2; statistical model reaction cross-sections.** Pearlstein, S. (Brookhaven National Lab., Upton, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048504.

Maximum of - 19 reaction types.

THRES2 calculates neutron-induced reaction cross sections from 0 to 20 MeV and fission spectrum averages for nuclides having 21 to 82 protons. Reaction products considered are 2n, 3n, p, d, t, He-3, alpha, np, nd, nt, n-He3, n-alpha, pn, 2p, p-alpha, alpha-n, alpha-p, and dn.CDC6600;IBM360; FORTRAN IV; SCOPE (CDC6600), OS/360 (IBM360); The program uses 13K (decimal) on the CDC6600.

22356 **(CONF-820896—6) High-spin resonances in heavy-ion collisions.** Betts, R.R.; Saini, S. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 18p. NTIS, PC A02/MF A01. Order Number DE83007800.

From Nordic meeting on nuclear physics; Fuglso, Denmark (16 Aug 1982).

Excitation functions for elastic scattering and reactions of ^{28}Si + ^{28}Si show evidence for the existence of narrow (Γ = 100 to 200 keV) high-spin (J $\approx$ 40 π) resonances. The interpretation of these resonances as high-spin fissioning shape isomers is discussed with reference to data for the ^{28}Si + ^{30}Si and ^{30}Si + ^{30}Si systems.

22357 **(CONF-8110242—2) High-angular-momentum resonances in ^{28}Si + ^{28}Si scattering.** Betts, R.R. (Argonne National Lab., IL (USA)). Oct 1981. Contract W-31-109-ENG-38. 14p. NTIS, PC A02/MF A01. Order Number DE83007762.

From International workshop on resonances in heavy ion collisions; Bad Honnef, F.R. Germany (12 Oct 1981).

The initial expectation was that resonance behavior in heavy-ion systems would be limited to only a few special systems and to energies not too far above the Coulomb barrier. The past few years have shown us that this behavior has a much wider extent than was previously thought possible, although in many cases the indications of resonance behavior is at best qualitative. Results are presented for the ^{28}Si + ^{28}Si system - the heaviest in which resonance behavior has yet been observed. (WHK)

22358 **(DOE/ER/10710—3) Nuclear-structure studies via neutron interactions. Progress report, July 1, 1982-June 30, 1983.** Carlton, R.F. (Middle Tennessee State Univ., Murfreesboro (USA)). Feb 1983. Contract AS05-80ER10710. 17p. NTIS, PC A02/MF A01. Order Number DE83008268.

Resolved resonances from neutron total cross section measurements on ^{186} ^{188}Os have been analyzed by a Reich-Moore multilevel code to obtain parameters for a total of 27 resonances. Strength functions and level spacings have been deduced and firm J/sup π/ assignments have been made. Preliminary parameters have been obtained from 500 eV to 5 keV in an effort to overlap with average total cross section measurements. Neutron transmission and capture measurements upon ^{34}S have been analyzed to obtain resonance parameters for s-, p-, and d-wave neutrons. Theoretical doorway state configurations have been assigned to specific groups of these resonances based upon shell model and core-vibration calculations. Using the ^{30}Si+n reaction as a probe two J=1/2+ resonances in ^{31}Si, predicted from shell model calculations, have been found. An observed uniform fragmentation of p-wave strength is in agreement with calculations of negative parity states for ^{30}Si and ^{32}S. Parameterization of the additional information contained in the regions between resonances and often ignored has permitted the determination of average scattering functions for s- and p-waves for ^{30}Si+n and ^{34}S+n. Their description with an optical model potential suggests a real well depth 20% greater for p-waves than for s-waves. Results are consistent with coupled channels calculations and results of a similar analysis for ^{32}S+n.

22359 (INIS-mf—7432, pp vp) **(n,α) and (n,p) reactions with 3 MeV neutrons.** Florek, M.; Oravec, J.; Szarka, I. (Komenskeho Univ., Bratislava (Czechoslovakia). Prirodovedecka Fakulta); Sassonov, S.; Helfer, H. (Technische Univ., Dresden (German Democratic Republic). Sektion Physik). [nd]. (In Slovak). NTIS (US Sales Only), PC A06/MF A01.

From 6. conference of Czechoslovak physicists; Ostrava, Czechoslovakia (27 Aug 1979).

22360 (INIS-mf—7432, pp vp) **Measurement of epsilon/β$^+$ ratio in nuclear decay.** Vanko, J.; Povinec, P.; Sykora, I. (Komenskeho Univ., Bratislava (Czechoslovakia). Prirodovedecka Fakulta). [nd]. (In Slovak). NTIS (US Sales Only), PC A06/MF A01.

From 6. conference of Czechoslovak physicists; Ostrava, Czechoslovakia (27 Aug 1979).

22361 **Isomer ratio measurements for the reaction ^{29}Si(^{18}O, p2n)sup(44m,44g)Sc.** Groening, H.; Aleklett, K.; Moody, K.J.; McGaughey, P.L.; Loveland, W.; Seaborg, G.T. (California Univ., Berkeley (USA). Lawrence Berkeley Lab.). *Nuclear Physics* [*Section*] *A;* **389**: No. 1, 80-92(8 Nov 1982).

Isomer ratios for the reaction ^{29}Si(^{18}O, p2n)sup(44m)Sc, sub(44g)Sc have been deduced from activity measurements for projectile energies between 30 and 99 MeV. Statistical model calculations show that the isomer ratio dependence on projectile energy up to about 80 MeV can be adequately described by assuming a fixed ratio of quadrupole to dipole γ-ray strengths. Such a ratio of E2/E1 strengths agrees with corresponding values deduced from the literature. The values of the γ-ray strength ratios needed to fit the experimental isomer ratios are extremely sensitive to the relative amounts of quadrupole γ-ray admixture and to the presence of discrete levels other than those which conform to the yrast line.

22362 **Interactions of polarised tritons with ^{32}S.** Barnwell, J.M. (Birmingham Univ. (UK). Dept. of Physics); Griffiths, R.J. (King's Coll., London (UK). Wheatstone Physics Lab.); Brown, R.E.; Hardekopf, R.A.; Jarmie, N.; Correll, F.D. (Los Alamos National Lab., NM (USA)). *Nuclear Physics* [*Section*] *A;* **388**: No. 3, 542-562(1 Nov 1982).

Cross sections and analysing powers have been measured for the elastic and inelastic scattering of tritons from ^{32}S, along with the ^{32}S(t vector, α)^{31}P reaction data, using the 17 MeV polarised triton beam available at the Los Alamos National Laboratory. An optical model analysis of the elastic scattering data has yielded a triton spin-orbit potential with an unconventional geometry. The inelastic analysing powers have shown a requirement for including the deformation of the spin-orbit potential in the coupling potential form factor. The (t vector, α) reaction data have been analysed using the zero-range DWBA. Certain features of this reaction data which could not be described by th e DWBA are well predicted when the analysis is extended to include explicitly the inelastic couplings and two-step processes through a CCBA calculation.

6515 Nuclear Properties And Reactions, A=39-58

REFER ALSO TO CITATION(S) 22188, 22355, 22356

22363 (INIS-mf—7432, pp vp) **Internal bremsstrahlung accompanying ^{54}Mn and ^{204}Tl decay.** Stanicek, J.; Chudy, M.; Povinec, P. (Komenskeho Univ., Bratislava (Czechoslovakia). Prirodovedecka Fakulta). [nd]. (In Slovak). NTIS (US Sales Only), PC A06/MF A01.

From 6. conference of Czechoslovak physicists; Ostrava, Czechoslovakia (27 Aug 1979).

6516 Nuclear Properties And Reactions, A=59-89

REFER ALSO TO CITATION(S) 22355, 22359, 22360

22364 **(Juel-Spez—158) Study of the level schemes of ^{75}Se, ^{76}Se, and ^{77}Se by capture of thermal neutrons.** Tokunaga, Y. (Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Kernphysik). Jun 1982. 156p. (In German). Available from Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe (Germany, F.R.).

Dissertation submitted to Koeln Univ. (Germany, F.R.).

Slow-neutron capture γ-ray spectroscopy was carried out with metallic targets of ^{74}Se and ^{76}Se at Juelich, where the high-energy (n,γ) spectrum was measured with a pair spectrometer, and at Grenoble, where ^{74}SePb and ^{76}SePb alloy targets were exposed in high neutron flux regions for pair spectroscopy of the primary (n,γ) lines, for low-energy (n,γ) spectroscopy with the high-resolution curved crystal spectrometers, and for (n,e$^-$)-measurements with the conversion-electron spectrometer BILL. Gamma-decay schemes were constructed and very precise energies were obtained for sup(75-78)Se and for ^{75}As. For several states new Jsup(π) assignments could be made and for others ambiguities could be resolved. The ^{75}Se(n,γ) reaction was observed for the first time due to successive neutron capture in ^{74}Se in the high flux reactor at Grenoble. The cross section of this reaction was found to be approx. equal to 300+-100 b. The SePb targets have also allowed a study of the K X-ray widths of Pb. These widths show small deviations from theoretical values. Comparison of the primary (n,γ) transition strengths and the corresponding (d,p)-spectroscopic factors have revealed a significant difference in the neutron capture mechanisms for ^{74}Se(n,γ) and ^{76}Se(n,γ). The comparisons of the sup(75-77)Se level schemes with those of neighbouring nuclei and with the predictions of various nuclear models show that present theories are not yet able to describe the structures of the low-spin states in the neutron deficient Se isotopes satisfactorily.

22365 **Precision mass difference measurements in light rubidium and krypton isotopes utilizing beta-endpoints.** Moltz, D.M.; Toth, K.S. (Oak Ridge National Lab., TN (USA)); Avignone, F.T. III; Noma, H.; Ritchie, B.G. (South Carolina Univ., Columbia (USA)); Kern, B.D. (Kentucky Univ., Lexington (USA)). *Physics Letters,* [*Section*] *B;* **113**: No. 1, 16-20(3 Jun 1982).

A technique for precise determination of β- endpoints with an intrinsic germanium detector has been developed and checked with ^{27}Si and ^{58}Cu sources; Qsub(EC) values of 5272 +- 26, 8063 +- 44 and 2760 +- 42 keV have been obtained for mass-separated samples of ^{77}Rb, ^{75}Rb and ^{77}Kr, respectively. Mass surface systematics in this region have been examined and found to be consistent.

6517 Nuclear Properties And Reactions, A=90-149

REFER ALSO TO CITATION(S) 20559, 20559, 22374

22366 (ANL/NESC—482) COMNUC;CASCADE; compound nucleus reaction. Dunford, C.L. (Atomics International Div., Canoga Park, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048482.

COMNUC - Only reaction types listed above may be analyzed, but other reactions such as n,p and n,alpha may be included easily. CASCADE - Only dipole radiation is permitted in the gamma ray cascades. No discrete channels are permitted - only continuum particle emission.

COMNUC calculates neutron reaction cross sections using a statistical model for decay of the compound nucleus. Competing reaction types permitted are elastic, discrete and continuum inelastic, gamma ray emission, capture, fission, and n,2n. CASCADE solves the intranuclear gamma ray cascade equation to determine secondary particle emission probabilities. Competing processes considered are gamma ray emission, neutron emission and fission.IBM360; FORTRAN IV with one Assembler language subroutine for performing internal I/O.; OS/360; 150K bytes.

22367 (BNL—32460) Antiproton-nucleus interactions. Kahana, S. (Brookhaven National Lab., Upton, NY (USA); CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). 1982. Contract AC02-76CH00016. 11p. (CONF-8205103—4). NTIS, PC A02/MF A01. Order Number DE83006303.

From Workshop on physics at LEAR with low energy cooled antiprotons; Erice, Italy (9 May 1982).

The antiproton beams from LEAR are a means for uncovering a hopefully fertile source of physics in the interactions of antiparticles with nuclei. Bound or resonant states have been searched for in the anti N N system and perhaps one candidate found. Resonances in the anti N-A system may have an independent origin, unrelated to isolated states in the two-body system but nevertheless very revealing of the essential nature of the two-body forces. The use of antiproton projectiles to study conventional, and occasionally exotic nuclear structure warrants some attention because of the extreme peripherality of many anti p-induced reactions and the expected strong iso-spin selectivity for inelastic excitation of say giant resonances. The annihilation channels which generate strong absorption in the nuclear interior, localize direct reactions in the nuclear surface. In this fashion anti p's ressemble heavy-ion projectiles but possess the virtue of being a rather more elementary probe and it should be possible to calculate the average anti p-A interaction (optical potential) from something closer to first principles. Perhaps the most fundamental reason for using antinucleons is as carriers, into the target, of antiquarks. It is not at all clear that the sea quarks in a hadron, i.e. in the form of quark-antiquark pairs, exist on an equal footing with valence quarks. The production of cc states (and even of s anti s) appears highly suppressed in nucleon-nucleon collisions. This suppression must be taken into account in establishing the relative merits of pp or p anti p colliders in producing say the W-meson. By introducing antiquarks directly via anti N N and anti N-A one should surely obtain more definite information about q anti q interactions with LEAR, at the low momenta presumably crucial for hadron structure. (WHK)

22368 (CONF-8110181—4) Alpha-transfer reactions. Betts, R.R. (Argonne National Lab., IL (USA)). Oct 1981. Contract W-31-109-ENG-38. 11p. NTIS, PC A02/MF A01. Order Number DE83007761.

From Conference on nuclear technology in developing countries: problems and prospects; Trieste, Italy (12 Oct 1981).

Some of the essential features of the experimental results and theoretical interpretations of α-transfer reactions are summarized. (WHK)

22369 (DOE/ER/10493—12) Atomic-mass measurements and nuclear spectroscopy at TRISTAN. Progress report, February 1, 1982-January 31, 1983. Brenner, D.S. (Clark Univ., Worcester, MA (USA)). Feb 1983. Contract AC02-79ER10493. 38p. NTIS, PC A03/MF A01. Order Number DE83007331.

The research program is concerned with the measurement of atomic masses and decay modes of neutron-rich fission products and, with understanding the nuclear structure effects which give rise to these properties. This work is accomplished, primarily, by use of the TRISTAN on-line mass separator located at the High Flux Beam Reactor, Brookhaven National Laboratory. The determination of accurate masses for neutron-rich nuclei is useful in testing and refining mass equations which, in turn, find important application in calculations of astrophysical processes and for control and safety of nuclear reactors. The thrust of the spectroscopic studies has been to develop a data base for neutron-rich, far-from-stability nuclides in order to provide a new testing ground for nuclear models. In particular, we have been active in pursuing microscopic and phenomenological understanding of nuclear structure in regions of shape transition near shell and subshell closures.

22370 (DOE/ER/10516—15) Progress report and renewal proposal. Signell, P. (Michigan State Univ., East Lansing (USA). Dept. of Physics). 1982. Contract AC02-79ER10516. 9p. NTIS, PC A02/MF A01. Order Number DE83008331.

We have been working mainly on five inter-related subprojects: (1) derivation of the intermediate range nucleon-nucleon interaction with the new dramatically altered $\pi\pi$ s-wave interaction and using a new method that utilizes much shorter and simpler analytic continuation through the unphysical region that lies between the πN and $\pi\pi$ physical regions of the N anti N$\rightarrow\pi\pi$ amplitude (with significantly improved accuracy for the nucleon-nucleon interaction); (2) construction of a short range phenomenological potential that, with the theoretical part mentioned above, gives a precise fit to the nucleon-nucleon data and is parameterized for easy use in nucleon calculations; (3) phase shift analyses of the world data below 400 MeV, especially the large amount of very precise data below 20 MeV and the new data near 55 MeV that have never been analyzed properly, and determining which phrases are given by theory at which energies; (4) the introduction of our K-matrix formulation of the Optimal Polynomial Expansion in order to accelerate convergence of the partial wave series at LAMPF energies; and (5) setting up of a cooperatively evaluated and verified permanent nucleon-nucleon data bank in the 0-1200 range that can be used by all nucleon-nucleon researchers (or anyone else) via Telenet dial-in and by means of a published compendium. Progress is reported. (WHK)

22371 (NASA-TM—83224) Analytic optical potentials for nucleon-nucleus nucleus-nucleus collisions involving light and medium nuclei. Bidasaria, H.B.; Townsend, L.W. (National Aeronautics and Space Administration, Hampton, VA (USA). Langley Research Center). Jan 1982. 25p. NTIS, PC A02/MF A01.

REFS.

Utilizing an optical model potential approximation to the exact nucleus-nucleus multiple-scattering series, optical potentials for nucleon-nucleus and nucleus-nucleus collisions are analytically derived. These expressions are applicable to light and medium cosmic ray nuclei as their single-particle density distributions are analytically determined, without approximation, from their actual harmonic well charge density distributions. Pauli correlation effects are included through the use of a simple Gaussian function to replace the usual expression obtained in the infinite nuclear matter approximation.

22372 (PB—82-208463) Electron excitation in atoms and molecules by neutron-nucleus scattering. (Science and Engineering Research Council, Chilton (UK). Rutherford Appleton Lab.). [nd]. 19p. (RL—82-016). NTIS, PC A02/MF A01.

The electronic excitation of atoms and diatomic molecules arising from neutron-nucleus scattering is examined. Both center-of-mass recoil and the coupling between electrons and nuclei arising from non-adiabatic terms neglected in the Born-Oppenheimer approximation are considered. A significant cross-section from center-of-mass recoil is predicted for single atoms for sufficiently large changes in the wavevector of the neutron. The non-adiabatic terms give rise to small cross-sections for molecules unless the spacing of the electronic states is comparable with the rotational energy constant, which is possible for transition between excited states. (Copyright (c) Science and Engineering Research Council 1982.)

22373 **Statistical properties from high resolution proton resonance reactions.** Mitchell, G.E. (North Carolina State Univ., Raleigh). pp 33-60 of Theory and applications of moment methods in many-fermion systems. Dalton, B.J.; Grimes, S.M.; Vary, J.P.; Williams, S.A. (eds.). New York, NY; Plenum Press (1980).

From Conference on theory and applications of moment methods in many fermion systems; Iowa City, IA, USA (10 Sep 1979).

High resolution proton resonance measurements are of great value in the study of statistical and non-statistical effects involving compound nuclear resonances. First, these measurements provide valuable information on both global and local properties of widths and spacings. This information is a valuable supplement to that obtained from neutron experiments. Second, as Mahaux and Weidenmueller summarize: Isobaric analog resonances provide the best understood examples of doorway states. They are thus well suited for an experimental check of the theory. Third, the measurement of channel spin interference effects provide the most sensitive test yet for certain aspects of statistical theories, as well as providing examples of new types of intermediate structure. Examples are discussed.

6518 Nuclear Properties And Reactions, A=150-189

REFER ALSO TO CITATION(S) 22353

22374 (CONF-820896—5) **Nuclear shape transitions and some properties of aligned-particle configurations at high spin.** Koo, T.L.; Chowdhury, P.; Emling, H. (Argonne National Lab., IL (USA); Purdue Univ., Lafayette, IN (USA); Niels Bohr Inst., Copenhagen (Denmark)). 1982. Contract W-31-109-ENG-38. 22p. NTIS, PC A02/MF A01. Order Number DE83007861.

From Nordic meeting on nuclear physics; Fuglso, Denmark (16 Aug 1982).

Two topics are addressed in this paper. First, we discuss the variation of shapes with spin and neutron number for nuclei in the N ≅ 88 transitional region. Second, we present comments on the feeding times of very high spin single-particle yrast states.

22375 (CONF-821143—4) **Shape transitions at high spin.** Khoo, T.L.; Chowdhury, P.; Emling, H. (Argonne National Lab., IL (USA); Purdue Univ., Lafayette, IN (USA); Michigan State Univ., East Lansing (USA); Gesellschaft fuer Schwerionenforschung m.b.H., Darmstadt (Germany, F.R.)). 1982. Contract W-31-109-ENG-38. 27p. NTIS, PC A03. Order Number DE83007788.

From High angular momentum properties of nuclei conference; Oak Ridge, TN, USA (2 Nov 1982).

Changes of nuclear shapes at high spin have been observed in several transitional nuclei, including ^{153} ^{154}Dy and ^{186}Hg. In the Dy isotopes a transition from collective to single-particle character appears at high spin suggesting a change from prolate to oblate shapes. In ^{186}Hg, decoupled i/sub 13/2/ quasiparticle bands with prolate and oblate shapes may have been observed in two crossing bands. The present discussion focusses on the polarizing effect of high-j rotation-aligned particles on the soft cores of these nuclei. Studies of the decay of the compound nucleus ^{156}Er, produced at the rather low excitation energy of 46 MeV in the reaction ^{64}Ni + ^{92}Zr, are also reported. Measurements of neutron spectra as a function of γ-sum energy and of the neutron multiplicity distribution have been performed. Comparison with the results of statistical model calculations suggests a suppression of neutron emission and it is speculated that this might be due to trapping in a superdeformed well.

22376 (INIS-mf—7432, pp vp) **Calculation of the ^{162}Dy(d,d') angular distribution at 12 MeV.** Holan, P.; Sterba, F.; Sterbova, J. (Karlova Univ., Prague (Czechoslovakia). Fakulta Matematicko-Fyzikalni); Cejpek, J. (Ceskoslovenska Akademie Ved, Rez. Ustav Jaderne Fyziky). [nd]. (In Czech). NTIS (US Sales Only), PC A06/MF A01.

From 6. conference of Czechoslovak physicists; Ostrava, Czechoslovakia (27 Aug 1979).

22377 (INIS-mf—7432, pp vp) **Study of ^{153}Tb decay oriented in a Gd matrix.** Dupak, J.; Finger, M.; Fominykh, M.I.; Konicek, J.; Pavlov, V.N.; Petrik, M.; Prochazka, I.; Tsupko-Sitnikov, V.M. (Joint Inst. for Nuclear Research, Dubna (USSR)); Muhonen, J. (Jyvaeskylae Univ. (Finland). Dept. of Physics). [nd]. (In Czech). NTIS (US Sales Only), PC A06/MF A01.

From 6. conference of Czechoslovak physicists; Ostrava, Czechoslovakia (27 Aug 1979).

22378 (INIS-mf—7432, pp vp) **Gamma transition mixing ratios in ^{152}Gd.** Rikovska, J. (Ceske Vysoke Uceni Technicke, Prague (Czechoslovakia)); Machova, A. (Ceske Vysoke Uceni Technicke, Prague (Czechoslovakia). Fakulta Jaderna a Fysikalne Inzenyrska); Dupak, J.; Konicek, J.; Pavlov, V.N.; Ferencei, J.; Finger, M.; Khan Khen Mo; Shchus, A.F. (Joint Inst. for Nuclear Research, Dubna (USSR)). [nd]. (In Czech). NTIS (US Sales Only), PC A06/MF A01.

From 6. conference of Czechoslovak physicists; Ostrava, Czechoslovakia (27 Aug 1979).

22379 (INIS-mf—7432, pp vp) **Nuclear structure study under the JASNAPP-1 programme at the JINR, Dubna.** Adam, J.; Hons, Z.; Honusek, M. (Ceskoslovenska Akademie Ved, Rez. Ustav Jaderne Fyziky). [nd]. (In Czech). NTIS (US Sales Only), PC A06/MF A01.

From 6. conference of Czechoslovak physicists; Ostrava, Czechoslovakia (27 Aug 1979).

22380 (INIS-mf—7432, pp vp) **Study of ^{155}Dy levels excited in ^{155}Ho decay.** Hnatowicz, V.; Zvolska, V.; Zvolsky, J. (Ceskoslovenska Akademie Ved, Rez. Ustav Jaderne Fyziky:; Gromov, K.; Kuznetsov, V.; Tsupko-Sitnikov, V.; Islamov, T.; Karakhodzhaev, A. (Joint Inst. for Nuclear Research, Dubna (USSR)). [nd]. (In Czech). NTIS (US Sales Only), PC A06/MF A01.

From 6. conference of Czechoslovak physicists; Ostrava, Czechoslovakia (27 Aug 1979).

22381 **Study of the rotational side-bands in ^{162}Dy.** Fields, C.A.; Hicks, K.H.; Ristinen, R.A. (Colorado Univ., Boulder (USA). Nuclear Physics Lab.); De Boer, F.W.N. (Colorado Univ., Boulder (USA). Nuclear Physics Lab.; Fribourg Univ. (Switzerland). Inst. de Physique); Walker, P.M. (Science Research Council, Daresbury (UK). Daresbury Lab.; Michigan State Univ., East Lansing (USA). Cyclotron Lab.); Borggreen, J. (Niels Bohr Inst., Roskilde (Denmark)); Peker, L.K. (Brookhaven National Lab., Upton, NY (USA). National Nuclear Data Center). *Nuclear Physics [Section] A;* **389**: No. 2, 218-246(15 Nov 1982).

Rotational side-bands in ^{162}Dy have been studied using the ^{160}Gd(α, 2nγ) ^{162}Dy reaction. Seven side-bands are observed, with Ksup(π) = 2^+, 2^-, $(0)^-$, 0^+, 5^-, 4^+ and (6^-). Four of these bands have collective structure at low spin: the Ksup(π) = 2^+ γ-vibrational band, the Ksup(π) = 0^+ β-vibrational band, and the Ksup(π) = 2^- and $(0)^-$ octupole vibrational bands. Of the remaining bands, the 4^+ band is deformation coupled while the 5^- and (6^-) bands are rotation-aligned. Several bandcrossings are observed in this nucleus. The β- and γ-bands are crossed at I = 6h and 12h, respectively, by a highly aligned $(\text{isub}(13/2))^2$ S-band; extrapolation of this S-band to higher spin suggests that it crosses the g.s.b. between I = 18h and 20h. The 2^- octupole band is crossed by the 5^- band at I = 9h and again by the (6^-) band at I = 12h. The latter bandcrossings are discussed in terms of two-quasiparticle plus rotor calculations.

22382 **Low lying 1^+ and 2^- states in doubly-odd terbium, holmium, and thulium nuclei.** Toth, K.S.; Ellis-Akovali, Y.A.; Moltz, D.M. (Oak Ridge National Lab., TN (USA)); Mlekodaj, R.L. (UNISOR, Oak Ridge, TN (USA)). *Physics Letters,* [*Section*] *B;* **117**: No. 1/2, 11-14(4 Nov 1982).

The β-decay properties of sup(150,152,154)Er and ^{156}Yb were investigated. It was found that, as in the case of sup(148,150,152)Dy, these nuclides decay predominantly to single 1^+ states in their doubly-odd daughters. Possible prolate configurations are proposed for the 1^+ levels and the 2^- isomeric states to which they deexcite.

6519 Nuclear Properties And Reactions, A=190-219

REFER ALSO TO CITATION(S) 22188, 22363

22383 **(CONF-8206132—2) Nuclear-breakup mechanisms in the interaction of relativistic projectiles with heavy targets.** Steinberg, E.P. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 10p. NTIS, PC A02/MF A01. Order Number DE83007614.

From Nuclear reaction mechanism conference; Varenna, Italy (14 Jun 1982).

The breakup of a Au nucleus under bombardment with relativistic p, α, and ^{20}Ne has been investigated in an extensive, multidetector study. The present discussion addresses some of the many aspects of the experimental results. A broad distribution of coincident fragment masses is observed, with the total fragment kinetic energy being higher than expected for a fission mechanism for total fragment mass $\leqq 120$. The formation of light fragments is shown to be inconsistent with a binary breakup mechanism, and a multi-fragment target breakup is suggested. In general, the results indicate a broad spectrum of violence in the collisions, from gentle, leading to the production of heavy spallation products and fission, to essentially explosive, leading to multi-fragment breakup into light mas products. These aspects of the reactions represent a late-stage breakup of the target residues and are positively correlated with the violence of the initial fast stage of the collision as measured by the charged particle multiplicity.

22384 **Strengths of E0 transitions in ^{188}Os and ^{196}Pt and the structure of IBA wavefunctions in the Os-Pt transition region.** Kane, W.R.; Casten, R.F.; Warner, D.D. (Brookhaven National Lab., Upton, NY (USA)); Schreckenbach, K.; Faust, H.R.; Blakeway, S. (Institut Max von Laue - Paul Langevin, 38 - Grenoble (France)). *Physics Letters,* [*Section*] *B;* **117**: No. 1/2, 15-19(4 Nov 1982).

In ^{188}Os and ^{196}Pt produced by thermal neutron capture E0 transitions have been investigated. The predictions of the interacting boson approximation are compared with the experimental results and discussed in terms of the detailed structure and systematics of individual energy levels in the transition from the IBA O(6) limit toward the deformed rotor.

6520 Nuclear Properties And Reactions, A=220 And Above

REFER ALSO TO CITATION(S) 20540

22385 **(ANL/NDM—74) Evaluation of the ^{238}U neutron total cross section.** Smith, A.; Poenitz, W.P.; Howerton, R.J. (Argonne National Lab., IL (USA)). Dec 1982. Contract W-31-109-ENG-38. 27p. NTIS, PC A03/MF A01. Order Number DE83007898.

Experimental energy-averaged neutron total cross sections of ^{238}U were evaluated from 0.044 to 20.0 MeV using regorous numerical methods. The evaluated results are presented together with the associated uncertainties and correlation matrix. They indicate that this energy-averaged neutron total cross section is known to better than 1% over wide energy regions. There are somwewhat larger uncertainties at low energies (e.g., $\leqq 0.2$ MeV), near 8 MeV and above 15 MeV. The present evaluation is compard with values given in ENDF/B-V.

22386 **(ANL/NESC—327R) DAFT1; least squares fit for fissile nuclide data.** Harris, D.R. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048327.

Data are fitted for a maximum of 3 fissile nuclides.

DAFT1 is a program for weighted least squares fitting of 0.0253 eV neutron data for fissile nuclides. The program also carries out computations relevant to discerning overall goodness of fit, particularly deviant data, and data whose improvement would lead to large reductions in error of each fitted parameter.CDC6600; FORTRAN IV; 32000 (octal) central memory locations.

22387 **(ANL/NESC—470R) GRAMP; r-m parameters of unresolved resonances.** Goldsmith, M. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048470.

The maximum number of resonances per spin state is 100. Two compound nucleus spin states are allowed and each spin state may have two open fission channels.

GRAMP randomly generates Reich and Moore parameters for multilevel unresolved resonances of fissile isotopes.CDC6600; FORTRAN IV.

22388 (INIS-mf—7432, pp vp) **Internal pair production in alpha decay of ^{241}Am.** Chudy, M.; Stanicek, J.; Povinec, P.; Usacev, S. (Komenskeho Univ., Bratislava (Czechoslovakia). Prirodovedecka Fakulta). [nd]. (In Slovak). NTIS (US Sales Only), PC A06/MF A01.

From 6. conference of Czechoslovak physicists; Ostrava, Czechoslovakia (27 Aug 1979).

22389 (INIS-mf—7432, pp vp) **Gamma radiation of ^{241}Am.** Stanicek, J.; Chudy, M.; Pisutova, N.; Povinec, P.; Usacev, S. (Komenskeho Univ., Bratislava (Czechoslovakia). Prirodovedecka Fakulta). [nd]. (In Slovak). NTIS (US Sales Only), PC A06/MF A01.

From 6. conference of Czechoslovak physicists; Ostrava, Czechoslovakia (27 Aug 1979).

22390 (INIS-mf—7432, pp vp) **(n,γf) reaction in ^{235}U.** Dlouhy, Z.; Duka-Zolyomi, A.; Kristiak, J.; Panteleev, Ts. (Joint Inst. for Nuclear Research, Dubna (USSR)). [nd]. (In Slovak). NTIS (US Sales Only), PC A06/MF A01.

From 6. conference of Czechoslovak physicists; Ostrava, Czechoslovakia (27 Aug 1979).

22391 (LA—9572-C-Vol.2, pp 422-427) **Study of fission dynamics by muon-induced fission.** Oberacker, V.E. (Vanderbilt Univ., Nashville, TN); Maruhn, J.A. Nov 1982. NTIS, PC A17/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

Prompt fission of ^{240}Pu induced by internal conversion in muonic atoms is studied theoretically. We treat the fission mode classically in terms of an elongation and a mass asymmetry coordinate and solve the time-dependent Schroedinger equation for the muon in the Coulomb field of the fissioning nucleus by methods similar to TDHF. The muon attachment to the light and heavy fission fragment is calculated as function of the friction coefficient and the fragment mass asymmetry.

22392 **(LBL—15685) Nuclear reactions and synthesis of new transuranium species.** Seaborg, G.T. (Lawrence Berkeley Lab., CA (USA)). Jan 1983. Contract AC03-76SF00098. 39p. (CONF-830214—1). NTIS, PC A03/MF A01. Order Number DE83006967.

From Workshop on future directions in transplutonium element research; Washington, DC, USA (28 Feb 1983).

In this short review, I shall describe the special aspects of heavy ion nuclear reaction mechanisms operative in the transuranium region, the role of new techniques, possible nuclear reactions for the production of additional transuranium elements and nuclear species and the importance of work in this region for the development of nuclear models and theoretical concepts. This discussion should make it clear that a continuing supply of leements and isotopes, some fo them relatively short-lived, produced by the HFIR-TRU facilities, will be a requirement for future synthesis of new elements and isotopes.

22393 **Possible ground-state octupole deformation in ^{229}Pa.** Ahmad, I.; Gindler, J.E.; Betts, R.R.; Chasman, R.R.; Friedman, A.M. (Chemistry Division, Argonne National Laboratory, Argonne, Illinois 60439). *Physical Review Letters;* **49**: No. 24, 1758-1761(13 Dec 1982). Contract W-31-109-ENG-38.

Evidence is presented for the occurrence of a $(5/2)^{+-}$ parity doublet as the ground state of ^{229}Pa, in agreement with a previous theoretical prediction. The doublet splitting energy is measured to be 0.22 +- 0.05 keV. The relation of this doublet to ground-state octupole deformation is discussed. .ID LV2109 .PG 1762 1764

22394 **Breaking of intrinsic reflections symmetry in nuclear ground states.** Leander, G.A.; Sheline, R.K. (Florida State Univ., Tallahassee (USA)); Moeller, P.; Olanders, P.; Ragnarsson, I. (Lund Inst. of Tech. (Sweden)); Sierk, A.J. (Los Alamos National Lab., NM (USA)). *Nuclear Physics [Section] A;* **388**: No. 3, 452-476(1 Nov 1982).

Negative-parity excited states of doubly even nuclei have earlier been attributed to vibrational excitations. This paper shows that an interpretation starting from a reflection asymmetric intrinsic state is more appropriate for certain nuclei in the radium region. Theoretical evidence for stable octupole deformation comes from a deformed shell-model calculation in which we use a single-particle potential with a realistic radial shape and a finite-range interaction for the surface energy. The octupole effect systematically improves the agreement between theoretical and experimental masses. The low-lying 0^+ excitations observed in experiment are compatible with the calculated collective octupole potentials. The possibility of obtaining further evidence from the spectroscopy of odd-mass nuclei is considered in an exactly solvable model, which shows that the smaller energy splitting observed in odd-A parity doublets mainly reflects single-particle fragmentation of the collective mode. The systematics of theoretical shell structure and experimental spectroscopy suggests the presence of other regions of octupole collectivity near the limits of stability.

22395 **Measurement of the neutron-induced fission cross section of /sup 232/Th relative to /sup 235/U from 0.7 to 30 MeV.** Behrens, J.W.; Browne, J.C.; Ables, E. (Lawrence Livermore Natl Lab, CA, USA). *Nuclear Science and Engineering;* **81**: No. 4, 512-519(Aug 1982).

The fission cross-section ratio /sup 232/Th:/sup 235/U has been measured as a function of neutron energy from 0.7 to 30 MeV using ionization fission chambers, the threshold cross-section method, and the time-of-flight technique at the Lawrence Livermore National Laboratory 100-MeV electron linear accelerator. The measured cross-section ratio, averaged over the neutron energy interval from 1.75 to 4.00 MeV, was 0.1086 /plus or minus/ 0.0024. 29 refs.

22396 **Calculated beta-spectra from decay of fission products produced by thermal-neutron fission of ^{235}U.** Dickens, J.K. (Oak Ridge National Lab., TN (USA)). *Physics Letters, [Section] B;* **113**: No. 3, 201-204(17 Jun 1982).

Beta-ray spectra from decay of fission products created by thermal-neutron fission of ^{235}U have been calculated using summation techniques and using an independently created beta-ray data file. The calculated beta-ray spectra are in very good agreement for Esub(β) approx. equal to 1 to 8 MeV with recently measured spectra of beta rays for two very different exposure and counting time conditions: (a) an 'instantaneous' spectrum following a 1.5 day exposure, and (b) an 8 s counting-time spectrum obtained 1.7 s following a 1 s exposure of ^{235}U by thermal neutrons.

6530 Nuclear Theory

REFER ALSO TO CITATION(S) 22299, 22367, 22582

22397 **(DOE/ER/03463—91) Theory of heavy-ion collisions. Final report.** Sperber, D. (Rensselaer Polytechnic Inst., Troy, NY (USA)). Dec 1982. Contract AC02-76ER03463. 27p. NTIS, PC A03/MF A01. Order Number DE83007974.

The main object of the research program was to better our understanding of the mechanism and dynamics of heavy-ion reactions. Some of the ideas are equally applicable to fission. Therefore, in some cases we also undertook the study of fission. The work can be divided into the following categories: (1) statistical study of highly excited states with high spin and studies of isomer ratios for spin and shape isomers; (b) dynamical models for fusion; (c) dynamical models for damped collisions; (d) pre-equilibrium aspects of heavy ion collisions; and (e) pion emission in relativistic heavy-ion collisions.

22398 (INIS-mf—7432, pp vp) **Splitting of states in odd-odd deformed nuclei.** Holan, P.; Kvasil, J. (Karlova Univ., Prague (Czechoslovakia). Fakulta Matematicko-Fyzikalni). [nd]. (In Czech). NTIS (US Sales Only), PC A06/MF A01.

From 6. conference of Czechoslovak physicists; Ostrava, Czechoslovakia (27 Aug 1979).

22399 (INIS-mf—7432, pp vp) **Inclusion of surface interactions in exciton model.** Gmuca, S.; Ribansky, I. (Slovenska Akademia Vied, Bratislava (Czechoslovakia). Fyzikalny Ustav). [nd]. (In Slovak). NTIS (US Sales Only), PC A06/MF A01.

From 6. conference of Czechoslovak physicists; Ostrava, Czechoslovakia (27 Aug 1979).

22400 (INIS-mf—7432, pp vp) **Changes in deformation and radii of hypernuclei.** Zofka, J. (Ceskoslovenska Akademie Ved, Rez. Ustav Jaderne Fyziky:. [nd]. (In Czech). NTIS (US Sales Only), PC A06/MF A01.

From 6. conference of Czechoslovak physicists; Ostrava, Czechoslovakia (27 Aug 1979).

22401 (LA—9572-C-Vol.1, pp 88-105) **Δ isobars in nuclei.** Toki, H. (Michigan State Univ., East Lansing). Nov 1982. NTIS, PC A18/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

Δ isobars play important roles in many places in nuclear physics. As an example, the role of Δ isobars on pion absorption with the pion energy being in the resonance region is discussed. In addition to the standard two nucleon mechanism, a new process where two Δ isobars are excited following Δ isobar formation after pion absorption is proposed and claimed to be the dominant absorption process in heavy nuclei.

22402 (LA—9572-C-Vol.1, pp 250-269) **Nuclear chemistry at LAMPF II.** Liu, L.C. (Los Alamos National Lab., NM). Nov 1982. NTIS, PC A18/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

The availability at LAMPF II of a pion beam at energies substantially higher than those currently produced at LAMPF, and of other high-intensity particle beams, such as kaons and antiprotons, will offer vast new research possibilities not only in studying nuclear structure, but also in investigating many elementary strong interaction processes by using the nucleus as a laboratory. In the following, I discuss a number of new research programs which merit special attention. In our nuclear chemistry studies, we emphasize direct determination of dynamical properties of the final nuclei in a nuclear reaction. In general, these studies, though of a more inclusive character, can be carried out with high efficiency and will provide information which can serve as a guide for the planning of more elaborate investigations.

22403 (LA—9572-C-Vol.1, pp 327-345) **Possible investigations of the (K^-, K^+) reaction.** Hungerford, E. (Univ. of Houston, TX). Nov 1982. NTIS, PC A18/MF A01.

From 2. LAMPF workshop; Los Alamos, NM, USA (19 Jul 1982).

The (K^-, K^+) reaction is most easily visualized as occurring through a one or two step process. The Xi may in turn interact with nucleons so that Xip $\rightarrow \Lambda\Lambda$. Cross sections for such reactions have been calculated recently and representative examples are shown. Estimates of the quasi-free background are also shown. The physics expectations of such investigations are discussed under separate sections for Xi hypernuclei, ΛΛ hypernuclei, and the $s = -2$ dibaryon. Experimental investigations of (K^-, K^+) reactions require intense kaon beams between 1 to 2 GeV/c with a missing mass resolution on the order of 3 MeV. Present kaon facilities with these requirements are marginal or non-existent. Thus some effort is needed in beam design before such a program could begin. However, to fully study doubly strange systems much more intense secondary beams such as those produced at a kaon factory will be necessary.

22404 **Statistical spectroscopy.** French, J.B.; Kota, V.K.B. (Department of Physics and Astronomy, University of Rochester, Rochester, New York 14627). *Annual Review of Nuclear Science;* 32: No. 1, 35-64(1982).

Microscopic methods based on the central limit theorem are reviewed. (AIP)

22405 **Theory of giant resonances.** Goeke, K.; Speth, J. (Institut fuer Kernphysik, Kernforschungsanlage Juelich, D-5170 Juelich, West Germany). *Annual Review of Nuclear Science;* 32: No. 1, 65-115(1982). Contract AC02-76ER13001.

The Random Phase Approximation is used to discuss giant resonances. Sum Rules are considered in detail. (AIP)

22406 **Macroscopic approach to nuclear masses and deformations.** Myers, W.D.; Swiatecki, W.J. (Nuclear Science Division, Lawrence Berkeley Laboratory, University of California, Berkeley, California 94720). *Annual Review of Nuclear Science;* 32: No. 1, 309-334(1982). Contract W-7405-ENG-48.

Binding energy calculations are considered based on the liquid drop model. (AIP)

22407 **Relativistic nuclear collisions in perspective.** Gyulassy, M. (California Univ., Berkeley (USA). Lawrence Berkeley Lab.). *Comments on Nuclear and Particle Physics;* 10: No. 2, 69-78(May 1981).

Recent developments in the use of relativistic nuclear collisions to explore the properties of highly excited and dense nuclear matter are reviewed. Methods of determining the nuclear-matter equation of state (energy per baryon) at fixed density and temperature and the results of searches for new collective degrees of freedom or new phases of nuclear matter at high temperature and density, are examined.

22408 **Theory and applications of moment methods in many-fermion systems.** Dalton, B.J.; Grimes, S.M.; Vary, J.P.; Williams, S.A. (eds.). New York, NY; Plenum Press (1980). 511p. (CONF-790959—). . Contract AC02-79ER10403.

From Conference on theory and applications of moment methods in many fermion systems; Iowa City, IA, USA (10 Sep 1979).

Separate abstracts were prepared for 22 of the 26 papers presented. Four papers were previously included in the data base. (WHK)

22409 **Nuclear level densities in astrophysics.** Woosley, S.E. (Univ. of California, Santa Cruz). pp 61-79 of Theory and applications of moment methods in many-fermion systems. Dalton, B.J.; Grimes, S.M.; Vary, J.P.; Williams, S.A. (eds.). New York, NY; Plenum Press (1980).

From Conference on theory and applications of moment methods in many fermion systems; Iowa City, IA, USA (10 Sep 1979).

The use of statistical nuclear level densities in astrophysics is briefly reviewed. Particular attention is given to the role of nuclear level density formulae in cross-section calculations for nucleosynthesis studies and to the effects of an assumed Fermi-gas model upon the properties of matter at very high temperature. The use of β-strength functions in astrophysics is also briefly summarized.

22410 **Phenomenological approach to nuclear level densities.** Reffo, G. (Comitato Nazionale per l'Energia Nucleare, Bologna, Italy). pp 167-190 of Theory and applications of moment methods in many-fermion systems. Dalton, B.J.; Grimes, S.M.; Vary, J.P.; Williams, S.A. (eds.). New York, NY; Plenum Press (1980).

From Conference on theory and applications of moment methods in many fermion systems; Iowa City, IA, USA (10 Sep 1979).

The topic of nuclear level densities is considered from the standpoint of applications. A phenomenological approach is described in which relevant parameters are derived from known experimental quantities. Parameter systematics have been determined which may be used for interpolation where experimental information is not available.

22411 **Polynomial expansions and transition strengths.** Draayer, J.P. (Louisiana State Univ., Baton Rouge). pp 213-233 of Theory and applications of moment methods in many-fermion systems. Dalton, B.J.; Grimes, S.M.; Vary, J.P.; Williams, S.A. (eds.). New York, NY; Plenum Press (1980).

From Conference on theory and applications of moment methods in many fermion systems; Iowa City, IA, USA (10 Sep 1979).

The subject is statistical spectroscopy applied to determining strengths and strength sums of excitation processes in nuclei. The focus will be on a ds-shell isoscalar E2 study with detailed shell-model results providing the standard for comparison; similar results are available for isovector E2 and M1 and E4 transitions as well as for single-particle transfer and β^{+-} decay. The present study is intended to serve as a tutorial for applications where shell-model calculations are not feasible. The problem is posed and a schematic theory for strengths and sums is presented. The theory is extended to include the effect of correlations between H, the system Hamiltonian, and θ, the excitation operator. Associated with correlation measures is a geometry that can be used to anticipate the goodness of a symmetry. This is illustrated for pseudo SU(3) in the fp-shell. Some conclusions about fluctuations and collectivity that one can deduce from the statistical results for strengths are presented. (WHK)

22412 **Moment methods and Lanczos methods.** Whitehead, R.R. (Univ. of Glasgow, Scotland). pp 235-255 of Theory and applications of moment methods in many-fermion systems. Dalton, B.J.; Grimes, S.M.; Vary, J.P.; Williams, S.A. (eds.). New York, NY; Plenum Press (1980).

From Conference on theory and applications of moment methods in many fermion systems; Iowa City, IA, USA (10 Sep 1979).

In contrast to many of the speakers at this conference I am less interested in average properties of nuclei than in detailed spectroscopy. I will try to show, however, that the two are very closely connected and that shell-model calculations may be used to give a great deal of information not normally associated with the shell-model. It has been demonstrated clearly to us that the level spacing fluctuations in nuclear spectra convey very little physical information. This is true when the fluctuations are averaged over the entire spectrum but not if one's interest is in the lowest few states, whose spacings are relatively large. If one wishes to calculate a ground state (say) accurately, that is with an error much smaller than the excitation energy of the first excited state, very high moments, μ/ sub n/, n ~ 200, are needed. As I shall show, we use such moments as a matter of course, albeit without actually calculating them; in fact I will try to show that, if at all possible, the actual calculations of moments is to be avoided like the plague. At the heart of the new shell-model methods embodied in the Glasgow shell-model program and one or two similar ones is the so-called Lanczos method and this, it turns out, has many deep and subtle connections with the mathematical theory of moments. It is these connections that I will explore here.

22413 **Beta decay and strength distributions.** Hardy, J.C. (Chalk River Nuclear Labs., Ontario). pp 389-404 of Theory and applications of moment methods in many-fermion systems. Dalton, B.J.; Grimes, S.M.; Vary, J.P.; Williams, S.A. (eds.). New York, NY; Plenum Press (1980).

From Conference on theory and applications of moment methods in many fermion systems; Iowa City, IA, USA (10 Sep 1979).

With the increasing accessibility of nuclei far from stability, experimenters find themselves faced more and more often with complex β-decay schemes: nuclei with over 5 MeV of β-decay energy, exhibiting hundreds and perhaps thousands of transitions. A detailed level-by-level exposition of such schemes - for example, by studying β-delayed γ-rays - is at best prohibitively time consuming, and at worst actually impossible with current techniques. Furthermore, even if reliable schemes are obtained experimentally, their confrontation with theory is severely limited by the absence of theories sufficiently complete to account for such complex spectra. From both points of view, experimental and theoretical, there is strong motivation to find a broader perspective, emphasizing these general features without being overwhelmed by a proliferation of detail. Similar difficulties in the field of slow neutron spectroscopy led, decades ago, to the development of statistical techniques, which more recently have been applied to β-decay. In essence, these place significance on the observed transition probability per energy interval - the β strength function - rather than per energy level. This approach at once makes experiment more tractable, and provides a convenient basis for comparison with theory. What is done here is to describe the data that are now available, suggest which are most likely to be reliable, and outline the methods that are currently used in their analysis. (WHK)

22414 **Study of effective interactions and models in nuclei using the moment method.** Parikh, J.C. (Physical Research Lab., Ahmedabad, India). pp 405-422 of Theory and applications of moment methods in many-fermion systems. Dalton, B.J.; Grimes, S.M.; Vary, J.P.; Williams, S.A. (eds.). New York, NY; Plenum Press (1980).

From Conference on theory and applications of moment methods in many fermion systems; Iowa City, IA, USA (10 Sep 1979).

Theoretical investigation of nuclear properties almost always involves the use of approximate schemes. A common starting point in many of these studies is the shell-model which describes a nucleus as a system consisting of m active nucleons in a N-dimensional single-particle space having an effective (1+2)-body Hamiltonian H. The Schrodinger equation in such a case reduces to a matrix (diagonalization) problem. The dimensionality of the matrix increases very rapidly with m and N. As a result, numerical computations become very large and hence additional approximations have to be used. One approach is to invoke symmetries like space symmetry and SU(3) in light nuclei so that there is a substantial reduction in the size of the many-particle vector space. Another approach which is more widely applicable is the variational one and in particular the Hartree-Fock (HF) approximation. Here the ground state is approximated by a single determinantal wave function having the lowest energy. In most of these applications the effective two-body interaction is chosen to be either a phenomenological one or a realistic one deduced from the free nucleon-nucleon interaction. It is of interest to study the nature of the Hamiltonian operator H under the group transformations which define the model in such spectroscopic spaces - i.e., a tensor decomposition of the interaction under the appropriate group is carried out. From this one would know about the different possible tensor components of H and their relative importance. One would also learn about symmetry breaking-its nature and the tensor components which lead to the breaking. Work done for effective interactions decomposed according to irreducible tensors under the transformations generated by the HF s.p. basis as well as the space symmetry is described.

22415 **Realistic Hamiltonians for no-core moment method studies.** Vary, J.P. (Ames Lab., IA). pp 423-436 of Theory and applications of moment methods in many-fermion systems. Dalton, B.J.; Grimes, S.M.; Vary, J.P.; Williams, S.A. (eds.). New York, NY; Plenum Press (1980).

From Conference on theory and applications of moment methods in many fermion systems; Iowa City, IA, USA (10 Sep 1979).

Motivated by the need to test the adequacy of realistic nucleon-nucleon potentials for yielding the dynamics of many-nucleon systems we develop effective Hamiltonians for large-space moment method studies. These Hamiltonians consist of the relative kinetic energy operator and an exact Brueckner G-matrix acting between all pairs of nucleons in the nucleus. That is, there is no core and the nuclear properties are obtained through moment methods as a function of the size of the model space. The primary initial emphasis is to obtain the binding energy and comparisons are made with results of the coupled-cluster or exp(s) calculations. We find a systematic but slow decrease in the importance of three and higher body effective forces as the model space is increased. The results with the Reid soft core interaction for the binding energy of ^{16}O appear to be converging close the the exp(s) results. Further tests of the moment methods themselves are indicated as well as the desirability of increasing still further the model space for the no-core studies.

22416 **Fixed-J moments: exact calculations.** Jacquemin, C. (Universite de Paris-11, Orsay, France). pp 437-450 of Theory and applications of moment methods in many-fermion systems. Dalton, B.J.; Grimes, S.M.; Vary, J.P.; Williams, S.A. (eds.). New York, NY; Plenum Press (1980).

From Conference on theory and applications of moment methods in many fermion systems; Iowa City, IA, USA (10 Sep 1979).

We show that the two first fixed J moments of the Hamiltonian operator can be easily calculated over the whole fixed particle number shell model space as well as over configurations. The method may be extended to higher moments of H and to include the isotopic spin T.

22417 **Radial densities of nuclear matter and charge via moment methods.** Dalton, B.J. (Ames Lab., IA). pp 451-462 of Theory and applications of moment methods in many-fermion systems. Dalton, B.J.; Grimes, S.M.; Vary, J.P.; Williams, S.A. (eds.). New York, NY; Plenum Press (1980). Contract W-7405-ENG-82.

From Conference on theory and applications of moment methods in many fermion systems; Iowa City, IA, USA (10 Sep 1979).

In this report I will discuss some initial efforts in our program to describe radial densities of nuclear matter and charge with the use of moment methods. A brief introduction to trace reduction formulas and computation problems along with proposed methods to overcome them will be given. This will be followed by a general discussion on computation of expectation values using moment methods with particular emphasis on formulation for the radial density applications.

22418 **Sum-rules, strength distributions and giant resonances.** Bohigas, O. (Institut de Physique Nucleaire, Orsay, France). pp 463-499 of Theory and applications of moment methods in many-fermion systems. Dalton, B.J.; Grimes, S.M.; Vary, J.P.; Williams, S.A. (eds.). New York, NY; Plenum Press (1980).

From Conference on theory and applications of moment methods in many fermion systems; Iowa City, IA, USA (10 Sep 1979).

It is well known that atomic nuclei show collective properties. One important aspect of collective motion is the concentration in energy of excitation strength. This is best illustrated by the nuclear photo effect which has the following two main characteristics: (1) the photoabsorption cross-section shows, all over the periodic table, a broad peak that takes a large part of the integrated photo cross-section; (2) the variation of the peak energy is a smooth function of the mass number A. Two main routes can be followed in order to describe such a behavior: (1) the more detailed, in which the strength function S(E) is calculated at all energies E, and

(2) a more global in which only some energy moments of the strength function S(E) are computed. The purpose of this talk is to describe some methods and applications corresponding mainly to the second route. A description of the strength distribution by its energy moments or sum-rules will be especially suited when the excitation strength is highly collective, in which case one can hope that the knowledge of a very limited number of moments will give the salient features of S(E). Would S(E) have a complicated structure as a function of E then many moments would be required in order to reproduce its properties.

6540 Radiation And Shielding Physics

REFER ALSO TO CITATION(S) 20502, 20531, 20558, 21671, 21671, 21672, 21672, 21921, 22258, 22632

22419 **(AD-A—118299/7) Improved treatment of multiple scattering of intense charged particle beams. Interim report.** Hughes, T.P.; Godfrey, B.B. (Mission Research Corp., Albuquerque, NM (USA)). Jul 1982. 31p. NTIS, PC A03/MF A01.

The scattering of self-pinched particle beams propagating in gas is investigated using Moliere's treatment of multiple scattering. Nordsieck lengths significantly longer than those predicted on the basis of less accurate scattering formalisms are obtained numerically. An improved analytic-expression for the Nordsieck length is derived and agrees well with the numerical results. Experimental data on the beam expansion from the PHERMEX and ASTRON experiments show good agreement with numerical simulations and analytic results.

22420 **(ANL/NESC—28) FOG; one-dimensional few-group few-gp diffusion slab cylinder sphere.** Brunnenmeyer, R.L.; Mickle, R.A. (Bechtel Corp., San Francisco, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048028.

Input data must be macroscopic. Scattering is limited to the next lower group. 1 to 4 energy groups are permitted.

The FOG program solves the one-dimensional few-group diffusion equations in any of three geometries slab, cylinder, or sphere. Provisions are made for calculating the flux, the adjoint flux, and various criticality searches as well as a buckling iteration and automatic Tschebyscheff polynomial computation of source extrapolation factors.GE625; FORTRAN IV.

22421 **(ANL/NESC—29) AIM6; one-dimensional multigroup diffusion slabs, cylinders, and spherese.** Nakamura, S.; Bennedict, W. (Ohio State Univ., Columbus (USA). Dept. of Nuclear Engineering). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048029.

AIM6 solves the one-dimensional multigroup diffusion equations utilizing a microscopic cross section library. Any of three geometries are available slab, cylinder, or sphere. Criticality searches are provided including a concentration search on one or two elements. Homogeneous and inhomogeneous problems may be solved with a variety of boundary condition options.IBM370; FORTRAN IV; OS/370; 300K bytes and 1 scratch unit.

22422 **(ANL/NESC—30) PERT; one-dimensional perturbation for AIM and FOG codes.** Gowins, G. (Boeing Co., Huntsville, AL (USA). Boeing Huntsville Simulation Center). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048030.

PERT is a perturbation program designed for use with the AIM6 and FOG programs. Punched card output from these codes is used as input to PERT. Using cross-section data, fluxes, and adjoint fluxes, the relative change in keff can be calculated. Cross sections may be weighted with the adjoint flux and/or direct flux. The neutron lifetime for the delay groups may also be determined.IBM360; FORTRAN IV.

22423 **(ANL/NESC—39) EQUIPOISE3; two-dimensional, two group diffusion is slabs or cylinders.** Wang, C.L. (Institute of Nuclear Energy Research, Lung-Tan (Taiwan)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048039.

EQUIPOISE3 solves the two-group, two-dimensional, neutron diffusion equations in cylindrical or slab geometry.CDC CYBER73,175;CDC7600; FORTRAN IV; NOS/BE 1.2, 1.3 (CDC CYBER73), SCOPE 2.1 (CDC7600); 125,000 (octal) words of memory are required for execution.

22424 **(ANL/NESC—50) TEMPEST2; thermal neutron spectrum cross sections.** Gowins, G. (Boeing Co., Huntsville, AL (USA). Boeing Huntsville Simulation Center). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048050.

TEMPEST2 is a neutron thermalization program based upon the Wigner-Wilkins approximation for light moderators and the Wilkins approximation for heavy moderators. A Maxwellian distribution may also be used. The model used may be selected as a function of energy. The second-order differential equations are integrated directly rather than transformed to the Riccati equation. The program provides microscopic and macroscopic cross-section averages over the thermal neutron spectrum.IBM360; FORTRAN IV; OS/360.

22425 **(ANL/NESC—51) FORM; fast neutron spectrum cross section calculations.** Nakamura, S.; Kazemersky, P. (Ohio State Univ., Columbus (USA). Dept. of Nuclear Engineering). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048051.

The FORM, or FORTRAN-MUFT, program is a Fourier transform slowing-down code. A library tape containing 54-group microscopic cross sections, resonance parameters, inelastic scattering matrices, and source spectra is used to generate a 54-group flux spectrum and few-group constants.IBM370; FORTRAN IV; OS/370; 200K bytes storage.

22426 **(ANL/NESC—58) SIZZLE; one-dimensional multigroup diffusion depletion.** Blaine, R.A. (Atomics International, Canoga Park, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048058.

SIZZLE solves the one-dimensional, multigroup burnup problem in the diffusion theory approximation for fast intermediate reactors. After the initial calculation at t=0, average cross sections are computed for further calculations using one to six energy groups. Criticality may be maintained by use of a concentration search. The concentration of the various isotopes is permitted to vary only from region-to-region. Chains included are Th232, U238, and a fission product poison chain.IBM360; FORTRAN IV; OS/360.

22427 **(ANL/NESC—120) FAIMOS; one-dimensional, multigroup diffusion in slab, cylindrical, or spherical geometries .** Cockrell, R.G. (Boeing Co., Huntsville, AL (USA). Boeing Huntsville Simulation Center). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048120.

FAIMOS is a multigroup theory, one-dimensional neutron diffusion equation program based on AIM6 (NESC Abstract 29). The principal features are - (a) three geometries (planar, cylindrical, or spherical), (b) calculation of fluxes and multiplication factor, (c) one-iteration problems, (d) choice of one of five sets of boundary conditions at both the inner and outer boundaries, (e) criticality searches on transverse buckling, homogeneous poison, critical radius, location of a poison region boundary, location of a fuel region boundary, (f) adjoint flux calculation, and (g) extensive data edit.IBM360; FORTRAN IV (H); OS/360.

22428 (ANL/NESC—147) **AILMOE; cross section calculation of elastic scattering resonancess.** Blaine, R.A. (Atomics International, Canoga Park, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048147.

AILMOE is a modified form of the ANL ELMOE program. The Fourier transform of the fast neutron flux is found for a mixture of moderators heavier than hydrogen with the moderator scattering law rigorously accounted for.IBM360; FORTRAN IV (H); OS/360; Minimum of 256K bytes.

22429 (ANL/NESC—156) **EXTERMINATOR2; two-dimensional, multigroup diffusion program diffusion program.** Fowler, T.B.; Tobias, M.L.; Vondy, D.R. (Oak Ridge National Lab., TN (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048156.

Since FORTRAN IV variable-dimensioning techniques were used in EXTERMINATOR2, the only restriction on problem size is the available core storage. The code examines the problem size and stores fluxes and equation coefficients (except for scattering matrix coefficients which are recalculated at each iteration) according to the machine core size in one of four ways - (1) All fluxes and equation coefficients are contained in core and no I/O devices are used during the iterative part of the calculation. (2) All equation coefficients are contained in core and I/O devices are used to store the fluxes. (3) The fluxes are contained in core and I/O devices are used to store the equation coefficients. (4) Both coefficients and fluxes are used from I/O devices.

The multigroup, two-dimensional neutron diffusion equations are solved in x-y, r-z, or r-theta geometry.IBM360;GE625;CDC6600; FORTRAN IV; OS/360 (IBM360), GECOS (GE625), and SCOPE (CDC6600); A machine with a minimum of about 64K words of core storage and 5 I/O devices for temporary storage in addition to those for input data and printed output. Some problems may require 4 additional I/O devices.

22430 (ANL/NESC—173) **2DF; two-dimensional, multigroup discrete ordinate code.** Archibald, R.J. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048173.

Storage restrictions are specified by a complicated equation involving SN order, number of materials, mesh intervals, and energy groups, and specified boundary conditions.; Source deck (3711 cards) Sample problem (882 cards) Reference Notes and Inter-office Memoranda.

2DF is a two-dimensional, multigroup program written in FORTRAN for solving the neutron transport equation using the SN method. The program can determine the real or adjoint solution for x-y, r-z, or r-theta geometry. Isotropic, or a form of linear anisotropic, scattering may be considered. Various boundary conditions are allowed. The program also contains a number of search options whereby one can vary dimensions or concentrations to arrive at a predetermined eigenvalue. A distributed source may be specified. A library of cross sections is available on magnetic tape. Cross sections may be read from the library tape and/or from cards.UNIVAC1108; FORTRAN V; EXEC8.

22431 (ANL/NESC—185) **GAMTEC2; multigroup constant calculations for 0 to 10 MeV.** Carter, L.L.; Richey, C.R. (Pacific Northwest Lab., Richland, WA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048185.

The maximum number of concentric regions in the unit lattice cell is 16. Each region may contain up to 10 isotopes. Group constants may be computed for one thermal group and from 1 to 34 epithermal groups .

GAMTEC2 generates multigroup constants in the energy range from 0 to 10 MeV for either homogeneous mixtures or heterogeneous arrays consisting of cylinderized lattice cells. The thermal group constants are averaged over (1) Wigner-Wilkins light moderator spectrum, (2) Wilkins heavy moderator spectrum, or (3) a Maxwellian distribution. For heterogeneous arrays the spatial thermal flux is calculated by a monoenergetic P3 approximation. For epithermal energies, the slowing-down distribution is described by either a B1 or P1 approximation to the Boltzmann equation. Resonance absorption and fission are treated by the Adler-Nordheim method. An improved method over that used in GAM1 for averaging the resonance absorption contribution to the multigroup constants is included. Fuel lumping effects on the fast fission of U238 and Th232 are treated by an n-flight collision probability technique. Group constants are punched on cards in HFN (diffusion code) and DTF (SN transport code) formats.UNIVAC1107;GE625;CDC6400; FORTRAN IV; EXEC2 (UNIVAC1107) and SCOPE 3.4 (CDC6400); The code requires the use of 2 tape units in addition to the usual input and output units - one for the single data library tape and one for temporary storage. Also, an on-line card punch or tape for punch output is required. The CDC6400 version uses disk as scratch storage.

22432 (ANL/NESC—209) **DTF4; one-dimensional, multigroup discrete ordinate program.** Lathrop, K.D. (Los Alamos Scientific Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048209.

The variable dimensioning capability of FORTRAN IV has been utilized so that any combination of number of groups, number of spatial intervals, size of angular quadrature, etc., can be used that will fit within the total core storage available to a user. The code itself requires about 8000 words, but it can be shortened by deleting certain subroutines which perform optional calculations.

The linear, time-independent, Boltzmann equation for particle transport is solved for the energy space, and angular dependence of the particle distribution in one-dimensional slabs, cylinders, and spheres. Independent source or eigenvalue (multiplication, time-absorption, element concentration, zone thickness or system dimension) problems are solved subject to vacuum, reflective, or periodic boundary conditions. A complete energy-transfer scattering matrix is allowed for each Legendre component of the scattering cross section matrices.IBM360;CDC6600;GE625; FORTRAN IV (CDC6600), FORTRAN IV and MAP (GE625), FORTRAN IV and BAL (IBM360); OS/360 (IBM360), and SCOPE (CDC6600); No disks or tapes are used. A clock is used but, by removing a few program statements, this requirement can be eliminated.

22433 (ANL/NESC—212) **VARI-QUIR; time-dependent, two-dimensional, multigroup diffusion .** Collier, G. (Westinghouse Electric Corp., Large, PA (USA). Astronuclear Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048212.

Maxima of - 4 groups 6 precursor groups 36 regions 20 different materials; Source decks (6600-2012 cards, 360-1896 cards) Sample problems (6600-74 cards, 360-88 cards) Reference report and Note.

The time-dependent, multigroup, two-dimensional neutron diffusion equations are solved in x-y or r-z geometry.CDC6600;IBM360; FORTRAN IV; SCOPE (CDC6600) and OS/360 (IBM360).

22434 (ANL/NESC—216) **FSDP3; pointwise cross sections from Breit-Wigner parameters.** Mathews, D.R. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048216.

The maximum number of neutron energies is 5000 when the ENDF/B format input option is used and limited only by computing time considerations otherwise. A maximum of 3000 resonances per l-J state may be used with the ENDF/B format input option and 3000 s-wave resonances with the old input format. The number of resonances to be considered on each side of each neutron energy may be the same as the total number of resonances per l-J state except when the multilevel Breit-Wigner scattering option is used in which case a maximum of 100 resonances per l-J state on each side is allowed. Relative orbital angular momentum values l greater than 3 are not allowed (l=0 is an s-wave interaction). The mathematical assumptions needed to express the results in terms of the conventional Doppler line shape functions may be invalid at very low neutron energies. The basic formulation is incomplete for the very high temperatures attainable in stars or in nuclear explosions.

FSDP3 computes pointwise cross sections from single-level Breit-Wigner resonance parameters.UNIVAC1108; FORTRAN V; EXEC8; 50,511 (decimal) words for data storage plus 7995 words for instructions, an optional cross section output tape, and 2 scratch files (tape or drum) are required.

22435 (ANL/NESC—222) GAMBLE5; two-dimensional, multigroup diffusion in xy and rz geometry. Dorsey, J.P.; Froehlich, R. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048222.

Maxima of - 10 energy groups 255 different material regions 20,000 space mesh points (16,043 cards) .

The homogeneous 2-dimensional multigroup diffusion theory equations with arbitrary group-to-group scattering and arbitrary fission transfer are solved for heterogeneous assemblies in x-y and r-z geometry. Homogeneous logarithmic boundary conditions are used at the outer surface of the assembly and at the surface of non-diffusion regions. The results include the group and point-dependent neutron fluxes, the power distribution, the neutron multiplication factor (k-effective), and a detailed neutron balance.UNIVAC1108; FORTRAN IV and Assembly language; VERSION IX and EXEC2, GAX23; 65,536 words of core storage and 3 tape units on one data channel, 1,572,864 words of FH-880 drum storage from one data channel, and a peripheral printer.

22436 (ANL/NESC—241) HFN; one-dimensional, multigroup diffusion in slabs, cylinders, and spheres. Lilley, J.R. (Hanford Engineering Development Lab., Richland, WA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048241.

Greater than Less than Number of or equal to or equal to energy groups 2 20 regions 1 50 materials 1 100 group parameters 3500 groups* mesh points 2100.

HFN solves the homogeneous or inhomogeneous one-dimensional multigroup diffusion equation for its lowest eigenvalue and the corresponding direct and/or adjoint eigenvectors. Inhomogeneous boundary conditions and a flexible scatter-transfer matrix structure are included. Optional calculations include criticality searches, detector activation traverses, and integrals for perturbation theory analysis.UNIVAC1107;CDC6600,CYBER74; FORTRAN IV (99.9%) and SLEUTH-II (0.1%) (UNIVAC1107), FORTRAN IV (CDC6600); CSC EXEC2 Package B (UNIVAC1107), SCOPE 3.4 (CDC6600); 64K UNIVAC1107 with 786,432 word drum (exclusive of system requirements), a tape unit, on-line printer, card reader and clock. The CDC version requires 122K (octal) words of memory.

22437 (ANL/NESC—247) FLANGE1; scattering law cross section calculation. Borgonovi, G.M. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048247.

FLANGE1 computes neutron scattering kernels for a large class of moderators. Neutron scattering kernels are obtained from the scattering law computed by the code GASKET. FLANGE1 allows the calculationsulation of double differential cross sections, angular cross sections, total cross sections, and Legendre moments of the scattering kernel. The short collision time approximation is used for energy transfers larger than the maximum provided by GASKET.UNIVAC1108; FORTRAN V; EXEC2; 32K memory, 2 magnetic tapes, one scratch unit.

22438 (ANL/NESC—259) MUSCAT; view factor shielding code cavity geometry. Gerber, M.J.; Roos, B.W. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048259.

MUSCAT computes the incident scattered neutron currents as a function of position within (1) the cavity formed by two truncated concentric spheres, (2) the cavity between two concentric circular cylinders, or (3) a cylindrical cavity.UNIVAC1108; FORTRAN IV; EXEC2; 32K memory.

22439 (ANL/NESC—262) MACH1; one-dimensional, multigroup diffusion is slabs, cylinders, and spheres. Ott, K.O. (Purdue Univ., Lafayette, IN (USA). Dept. of Nuclear Engineering). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048262.

Maxima of - 20 spatial regions 150 mesh points 28 energy groups 5 modal spectra (IBM360 version) 15 downscatter groups 20 isotopes per problem 20 homogenized materials 20 isotopes per homogenized material A special scatter treatment is used which allows full downscatter for hydrogen isotopes .

MACH1 performs one-dimensional multigroup diffusion solutions and associated calculations, including criticality searches, perturbation, reaction summary, beta effective, group collapsing, and pointwise reaction rates and ratios. Several card dumps of computed data are available on option. A spectral synthesis option is available in the IBM version.CDC6500;IBM360,370/195; FORTRAN IV (CDC6500, IBM360-98%), BAL (IBM360-2%); OS/360 (IBM360) and SCOPE (CDC6500); The IBM360 version uses 5 tape drives and 1645K core storage assuming no overlay organization.

22440 (ANL/NESC—263) GASKET; thermal scattering law calculation. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Naliboff, Y.D. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048263.

Maxima of - 100 points in distributed frequency spectrum 100 points in anisotropic part of the frequency spectrum 2 discrete oscillators if w sub 1 does not equal zero, other- wise 20 20 phonon terms calculated for each delta line.

GASKET calculates the thermal neutron scattering law, s(alpha,beta), for a large class of moderators. Provision has been made in GASKET for the following dynamical modes of the scatterer - (1) free translation (gas), (2) diffusive or Brownian motion, (3) harmonic isotropic vibrations with continuous frequency spectrum, (4) harmonic anistropic vibrations with continuous frequency spectrum (as applied for instance to graphite), (5) harmonic isotropic vibrations with discrete frequency spectrum.UNIVAC1108; FORTRAN IV; EXEC2; 32K machine with about 26K available for the program and one scratch unit (drum, disk, or tape).

22441 (ANL/NESC—270) CAESAR4; liblst; one-dimensional, multigroup diffusion. Blaine, R.A. (Atomics International, Canoga Park, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048270.

Maxima of - 20 regions 20 elements in library 12 elements per material 10 materials 100 intervals 35 groups 10 downscatter groups 20 groups and 15 elements in resonance cross section calculation .

CAESAR4 solves the one-dimensional, multigroup, diffusion equations in any of three geometries and provides a wide choice of boundary conditions, criticality searches, edits and other auxiliary computations.IBM360; FORTRAN IV; OS/360; 256K bytes.

22442 (ANL/NESC—271) CLIP; form or thredes library utility routine. Blaine, R.A. (Atomics International, Canoga Park, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048271.

CLIP is the cross section library preparation and maintenance program for FORM and THREDES.IBM360; FORTRAN IV; OS/360; 256K bytes.

22443 (ANL/NESC—274R) WIGL2; one-dimensional, two-group space-time diffusion. Vota, A.V. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048274.

For the 6600 no restrictions are placed on single parameters related to problem size. The total amount of storage set aside for all parameters is 14,000 memory locations. This allows the user to decide which area requires a more detailed representation. For the 1108 - let i = number of delay groups n = number of compositions ndt = number of changes in time-step size p = number of spatial points k = number of thermal-hydraulic regions r = number of nuclear regions then (3*ndt + (3+i) * r + 40*n + 6*k + (8+i)*p + i) less than or equal to 12,000 and (26*p + r + 16*k + 12) less than or equal to 16,000.

WIGL2 is a one-dimensional two-group space-time diffusion theory program with zero, one, or six delayed neutron groups. The program will treat slab, cylindrical, and spherical geometries and includes non-boiling heat transfer. It accounts for xenon feedback and feedback effects due to fuel and coolant temperature. Control rod motion and control system feedback based on total core power or outlet coolant temperature can be simulated. Transients may be excited by prescribed changes in inlet coolant temperature, coolant flow rate, or rod position.CDC6600;UNIVAC1108;IBM370; FORTRAN IV; SCOPE 2.0 (CDC6600), EXEC 2 GAX27 (UNIVAC1108), and OS/370 (IBM370); On the 6600 WIGL2 requires 130,000 (octal) central memory words and one disk is used for storage of permanent files. The number of central memory words required could be decreased by decreasing the amount of storage set aside for parameters. On the 1108 64K of core memory and 2 tapes (input and output) are used. The 370 version uses 350K bytes of memory and a card punch.

22444 (ANL/NESC—275R) PDQ8;PDQ7; one, two, or three-dimensional, few group. Cadwell, W.R.; Pfeifer, C.J. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048275.

The total number of groups is limited to five, although six equations may be solved if the P(3) option is used. All storage is dynamic so no fixed problem size limits are imposed.

The PDQ series of programs is designed to solve the neutron diffusion-depletion problem in one, two or three dimensions. Very large problems can be accommodated. The three-dimensional spatial calculation may be either explicit or discontinuous trial function synthesis. Up to five lethargy groups are permitted. The fast group treatment may be simplified P(3), and the thermal neutrons may be represented by a single group or a pair of overlapping groups. Adjoint, fixed source, one iteration, additive fixed source, eigenvalue, and boundary value calculations may be performed. The programs utilize the HARMONY system to allow for time-dependent representation of cross section variation and generalized depletion chain solutions. In PDQ8 the depletion is a combination gross block depletion for all nuclides as well as a fine block depletion for a specified subset of the nuclides. The geometries available include rectangular, cylindrical, spherical, hexagonal, and, in PDQ8 only, a very general quadrilateral geometry with diagonal interfaces. All geometries allow variable mesh in all dimensions. Various control searches as well as temperature and xenon feedbacks are provided.CDC7600,6600,CYBER175,170;IBM360; PDQ8 - FORTRAN and COMPASS (RUN and FTN compatible); PDQ7 - FORTRAN IV and COMPASS (CDC CYBER175), FORTRAN FTN4.6 (CDC7600), FORTRAN IV (H) and BAL (IBM360); PDQ8 - SCOPE 1.1 (CDC7600), SCOPE 3.3 (CDC6600); PDQ7 - NOS 1.2 (CDC CYBER175), SCOPE 2.1.4 (CDC7600), OS/360 (IBM360); On CDC systems the central memory size should be at least 65K, the program will utilize up to 1000K of extended core memory, and up to four disks transferring in parallel. The IBM360 version of PDQ7 requires at least 400K bytes of memory and auxiliary disk storage (Models 2314 or 3330).

22445 (ANL/NESC—276) AVOID; annular void cross section calculation. Henderson, W.B. (General Electric Co., Cincinnati, OH (USA). Nuclear Materials and Propulsion Operation). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048276.

AVOID computes the equivalent diffusion coefficient and loss cross section of an annular void in a cylindrical reactor and the radial flux distribution in the void.GE625; FORTRAN IV; GECOS; 12K core memory exclusive of system use.

22446 (ANL/NESC—280R) M0807; two-dimensional diffusion absorption removal cross sections. Rutherford, C.H. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048280.

Two geometries are permitted, rectangular and 60-degree parallelogram. In rectangular geometry 70x70 mesh points are permitted and 60x60 for parallelogram geometry. As many as 99 compositions are allowed per problem .

M0807 solves the two-dimensional fixed-source diffusion equation for the absorption and removal macroscopic cross sections required to yield a specified reaction rate distribution.CDC6600; FORTRAN IV; SCOPE 2.0; 64K core storage, card reader, printer, and one auxiliary storage unit.

22447 (ANL/NESC—287) BISYN; two-dimensional, multigroup diffusion synthesis calculations. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Duncan, W.A. (General Electric Co., San Jose, CA (USA). Nuclear Energy Div.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048287.

Maximum number of regions in each dimension = 8. Maximum number of mesh points in each dimension = 75. Maximum number of energy groups = 16. Maximum downscatter = 8.

BISYN solves the two-dimensional, multigroup, neutron diffusion equations in x-y or r-z geometry using a noniterative synthesis method. This approach is designed to greatly reduce the computer cost of running two-dimensional multigroup problems at the risk of some loss in accuracy of the detailed flux distribution.GE635;UNIVAC1108; FORTRAN IV; GECOS III, SDL1 (GE635) and EXEC2 (UNIVAC1108); 47,000 words of memory, disk, drum, and 2 tapes for the GE635. 54K of fast memory, 2 tape drives, 510,000 words of peripheral storage and the ability to segment for the UNIVAC1108.

22448 (ANL/NESC—289) GAKER; inelastic scattering cross section calculations for moderators. Houston, D.H. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048289.

Maxima of - 75 energies 30 scattering angles 2 Legendre moments of the scattering kernel 3 vibrational oscillators Only the latter may not be easily changed.; Source deck (390 cards) Sample problem (15 cards) Reference report, GA-5798 pp. 155-162, and Note.

The GAKER code evaluates the inelastic, double-differential neutron scattering cross sections for moderators with phonon spectra which can be represented as sums of delta-functions. It is based on the original model for light water by Nelkin, which consisted of a translator, a hindered rotator (treated as an isotropic oscillator), and several vibrational oscillators. The code has been modified several times to include more oscillators and to treat anisotropic effects. Final energy-integrated cross sections are also calculated.UNIVAC1108; FORTRAN IV; EXEC2; 32K memory and 2 scratch files.

22449 (ANL/NESC—291) **HEXSCAT; elastic scattering cross sections hexagonal lattice.** Naliboff, Y.D. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048291.

HEXSCAT calculates P0 through P3 components of the polycrystalline coherent elastic neutron scattering cross section per nucleus for a hexagonal lattice. The code averages point values over input group boundaries to give smoothed group cross sections.UNIVAC1108; FORTRAN IV; EXEC2; 64K storage on the UNIVAC1108.

22450 (ANL/NESC—292) **PSEUDO; statistical resonance parameter calculations.** Mathews, D. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048292.

Resonance parameters are constructed from average nuclear properties in the unresolved resonance region.UNIVAC1108;IBM360; FORTRAN IV; EXEC2 (UNIVAC1108), OS/360 (IBM360); 15K memory.

22451 (ANL/NESC—298) **GGC4; multigroup cross sections fast thermal spectra.** Mathews, D.R. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048298.

Maxima of - 99 fast groups 101 thermal fine groups 99 fast broad groups 50 thermal broad groups 50 broad groups in the combining section 250 resonances per nuclide 2 moderators admixed with a resonance absorber 305 entries in the escape probability table for cylindrical geometries 505 entries in the escape probability table for slab geometries The energy dependence of the input bucklings is restricted to separate energy-independent fast- and thermal-section values (positive, negative or zero values are allowed in either section).

The GGC4 program solves the multigroup spectrum equations with spatial dependence represented by a single input buckling. Broad group cross sections (shielded or unshielded) are prepared for diffusion and transport codes by averaging with the calculated spectra over input-designated energy limits. The code is divided into three main parts. A fast (GAM) section which covers the energy range from 14.9 MeV to 0.414 eV, a thermal (GATHER) section which covers the energy range from 0.001 to 2.38 eV, and a combining (COMBO) section which combines fast and thermal cross sections into single sets. Basic nuclear data for the fast section which consists of fine group-averaged cross sections and resonance parameters is read from a data tape. The fine group absorption and fission cross sections may be adjusted by performing a resonance integral calculation. Utilizing a fission source and an input buckling, the code solves the P1, B1, B2, or B3 approximation to obtain the energy-dependent fast spectrum. Two or six spatial moments of the spectrum (due to a plane source) may also be evaluated. Instead of performing a spectrum calculation, the user may enter the Legendre components of the angular flux directly. For as many input-designated broad group structures as desired, the code calculates and saves (for the combining section) spectrum-weighted averages of microscopic and macroscopic cross sections and transfer arrays. Slowing down sources are calculated and saved for use in the lower energy range. Given basic nuclear data, the thermal section of GGC4 determines a thermal spectrum by either reading it as input, by calculating a Maxwellian spectrum for a given temperature, or by an iterative solution of the P0, B0, P1, or B1 equations for an input buckling.

22452 (ANL/NESC—308) **JUPITOR1;JP1; coupled channel x-sec evaluation.** Garcia de Viedma, L. (NEA Data Bank, 91 - Gif-sur-Yvette (France)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne IL 60539. Order Number DE83048308.

Maxima of six states and 30 partial waves can be coupled at one time. If the projectile energy becomes negative in some excited channels this maximum is reduced to 25 partial waves. The maximum value of the orbital angular momentum is 69. Differential cross sections for up to 100 angles for any number of states can be computed unless a polarized beam or target is considered, in which case the maximum is 35152 and Addenda.

JUPITOR1 is used to perform coupled-channel calculations to evaluate the cross sections for the scattering of nuclear particles by various collective nucleii.IBM360; FORTRAN IV; OS/360; 300K bytes of storage.

22453 (ANL/NESC—310) **GAKIN2; 10 multigroup time-dependent diffusion.** Dugan, E.T. (Florida Univ., Gainesville (USA). Dept. of Nuclear Engineering Sciences). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048310.

Variable dimensioning permits accommodation of any number of energy groups, space points, and material regions, within the limits of available storage. The number of delayed neutron groups is limited to 6. The number of bytes allocated for data storage is a function of the dimension of COMMON block A. The size of A, which is also the value of the variable MAX, must be greater than 8(P(G+D) + 2GD + 10G + G(G+1) + 25R + 19RG + RG**2 + 11P + 4PG + 2N + 50) where R is the number of regions, G is the number of neutron energy groups, D is the number of delayed neutron groups, P is the number of space points, and N is the number of test points for testing convergence and predicting transformation frequencies (recommended value is one or two times the number of material regions, R).

GAKIN2 solves the time-dependent multigroup neutron diffusion equations in one space dimension.IBM370; FORTRAN IV; OS/370; 275K bytes of storage on an IBM370/195.

22454 (ANL/NESC—318) **FEVER7; one-dimensional multigroup diffusion and depletion.** Wagner, M.R. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048318.

Maxima of - 7 energy groups 151 mesh points 20 regions 60 subregions 45 nuclides per subregion fixed sets of heavy nuclides; Source deck (5941 cards) Sample problem (786 cards) Reference reports.

FEVER7 performs a multigroup, 1-dimensional depletion calculation which allows fuel in various stages of irradiation to be homogenized into the same region for purposes of the diffusion calculation but follows the depletion of each of the subregions separately. The calculation may be interrupted periodically for refueling one or more regions. Recycling is optional and there is no limit to the number of refuelings which may be performed. A control poison search is available and concentration dependent self-shielding factors may be applied to a number of lumped poisons.UNIVAC1108; FORTRAN IV; EXEC2; 65K UNIVAC1108 or 1107 and 3 tapes (input, output, system).

22455 (ANL/NESC—319) **GASP7; one-dimensional burnup power distribution search.** Simon, W.A.; Wagner, M.R. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048319.

Maxima of - 7 energy groups 4 thermal neutron energy groups 151 mesh points 20 regions 45 different materials in each region 80 different cross section sets Downscattering from the fast groups into the next lower group only is permitted. The geometry assumed is cylindrical, and either radial or axial flux distributions may be calculated.

GASP7 calculates the one-dimensional distribution of fissile and fertile materials in a nuclear reactor which will yield any desired power distribution during the burnup history of the reactor core. A poison and poison distribution search for a desired multiplication and minimum power distribution perturbation can also be performed.UNIVAC1108; FORTRAN IV; EXEC2; 65K UNIVAC1108 or 1107 and 3 tapes (input, output, system).

22456 (ANL/NESC—320) **TEMCO7; temperature coefficient calculation.** Wagner, M.R. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048320.

Maxima of - 25 temperatures 3 fast energy groups 1-4 thermal energy groups 20 regions 151 mesh points 60 subregions 40 nuclides per subregion 80 cross section sets per temperature.

TEMCO7 computes reactor temperature coefficients.UNIVAC1108; FORTRAN IV; EXEC2; 65K UNIVAC1108 or 1107 and 3 tapes (input, output, system).

22457 (ANL/NESC—325) **2DB; two-dimensional multigroup diffusion and depletion.** Little, W.W.; Hardie, R.W. (Pacific Northwest Lab., Richland, WA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048325.

Since variable dimensioning is employed, no simple bounds can be stated. The current 1108 version, however, is nominally restricted to 50 energy groups in a 65K memory. In the 6600 version the power fraction, average burnup rate, and breeding ratio calculations are limited to reactors with a maximum of 50 zones.

2DB is a flexible, two-dimensional (x-y, r-z, r-theta, hex geometry) diffusion code for use in fast reactor analyses. The code can be used to: (a) Compute fuel burnup using a flexible material shuffling scheme. (b) Perform criticality searches on time absorption (alpha), material concentrations, and region dimensions using a regular or adjoint model. Criticality searches can be performed during burnup to compensate for fuel depletion. (c) Compute flux distributions for an arbitrary extraneous source.UNIVAC1108;CDC6600; FORTRAN IV; 65K memory and three peripheral storage devices.

22458 (ANL/NESC—338R) **TWIGL;TWIGGLE; two-dimensional, two-group space-time diffusion feedback.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy, J.H.; Hageman, L.A. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048338.

Maxima of - 37 spatial mesh points in the x or r direction 37 spatial mesh points in the y or z direction 2 energy groups 6 groups of delayed neutrons 20 difference material compositions 100 thermal-hydraulic regions for which the average tempera-tures are defined.

TWIGL solves the two-dimensional, two-group, space-time neutron diffusion equations in rectangular or cylindrical geometry in the presence of temperature feedback. The neutron diffusion and delayed precursor equations are differenced in both space and time. The thermal-hydraulic description is based on a no-boiling, one-pass model formulated in terms of regionwise-averaged coolant and fuel metal temperatures.CDC6600;IBM360; FORTRAN IV; SCOPE 2.0 (CDC6600) and OS/360; 64K memory.

22459 (ANL/NESC—339) **GAUGE; two-dimensional, few-group, neutron diffusion in hexagonal geometries.** Wagner, M.R. (General Atomic Europe, Zurich (Switzerland)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048339.

Maxima of - 1519 hexagonal fuel or reflector elements 4405 mesh points 4 energy groups with downscattering only into the next lower energy group 280 burnup regions 40 burnable nuclides 80 microscopic cross section blocks 5 variable self-shielding factor tables. The flux is assumed to be zero at the outer reactor boundary.

The two-dimensional few-group neutron diffusion theory equations for a uniform triangular mesh are solved to obtain the multiplication factor and the spatial flux and power distribution of reactors with hexagonal core configuration. Complete reactor life histories with partial refuelling at a number of reload time-points can be calculated. At each discrete time-point a control rod search may be performed to maintain criticality at all times. The depletion scheme of all burnable nuclides is specified by the user at execution time. Three modes of operation are possible - (1) straight burnup calculation, (2) control rod criticality search, allowing the adjustment of a number of control rod banks according to a prescribed rod sequencing scheme, and (3) a series of static calculations with insertion of rods into fixed, prescribed positions.UNIVAC1108; FORTRAN IV; EXEC2 (UNIVAC1108); 65K memory, one drum (or scratch tape) unit, input, output, and restart tapes.

22460 (ANL/NESC—341) **GANDY3; unresolved resonance cross secton calculation.** Koch, P.K.; Mathews, D. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048341.

GANDY3 will handle as many temperatures as desired for a maximum of 100 energy points. Consideration is given to neutron orbital angular momenta through d-wave (L=2).

GANDY3 evaluates temperature-dependent effective neutron capture, fission, and scattering cross sections in the unresolved resonance region from average resonance parameters.UNIVAC1108; FORTRAN IV; EXEC8; GANDY3 requires about 8300 locations for instructions and 22,700 locations for data. Two I/O devices are required for reading and printing and one additional I/O device is necessary if the program is loaded from tape..

22461 (ANL/NESC—342R) **M0648; one-dimensional slab transport with slowing down.** Lois, L. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048342.

Maxima of - 17 energy groups 12 regions 8 Legendre polynomial expansion coefficients 99 equally-spaced mesh-points per region 440 mesh points 10 material compositions No composition can consist of a multiplying medium or of a pure absorber. The boundary conditions can be arbitrary incident on either end or symmetry on one or both ends of the slab.

M0648 solves the one-dimensional slab transport problem with slowing-down for an arbitrary spatial external source and arbitrary scattering.CDC6600; FORTRAN IV; SCOPE 2.0; 154K (octal) memory and 4 tape units for scratch storage.

22462 (ANL/NESC—343R) **M0756;LETO; one-dimensional slab gamma-ray transport.** Lois, L. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048343.

Maxima of - 12 regions 10 materials 13 groups 151 mesh points per region 435 total mesh points 171 total energy mesh points 8 terms in the double range Legendre polynomial expansion of the flux 8 terms in the Legendre polynomial expansion of scattering.

LETO will solve the gamma ray transport and energy deposition problem in one-dimensional laminar slab geometry. The energy group scheme is employed to account for photon energy degradation. An arbitrary external spatial isotropic source may be specified with an arbitrary energy spectrum. The boundary conditions may be (a) free boundaries with arbitrary incident, (b) symmetry on the left arbitrary incident on the right, and (c) symmetry on both ends.CDC6600; FORTRAN IV; SCOPE 2.0; 140K (octal) memory and 3 tape units for scratch storage.

22463 (ANL/NESC—347) CODILLI; least squares analysis of resonance data. Adler, D.B.; Adler, F.T. (Illinois Univ., Urbana (USA). Dept. of Physics). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048347.

The analysis is limited to s-wave neutrons. A maximum of 32 resonance levels can be fitted while a maximum of 20 known resonances can also be introduced. Currently the program allows for 1000 energy points and their corresponding cross section value.

A least-squares analysis of neutron resonance data is performed using the multi-level expansion. The program can handle only one set of cross sections at a time. Options are provided for the analysis of reaction or total cross section data, and for the direct handling of transmission data. By option, one can include the multi-level interference or perform the fit in terms of superimposed symmetric Breit-Wigner lines, while the potential scattering interference is always included in the trial function for the total cross section. Provisions are given for Gaussian and non-Gaussian resolution functions. In the latter case, modification of one subroutine allows for adaptation to any kind of experimental conditions. The relevant convolution integrals involving the trial function are evaluated by Simpson integration with an optional number of integration steps. Besides the resonances to be fitted, the trial function contains an optional number of resonances having known parameters, which may represent resonances external to the region being fitted as well as resonances within the energy interval of interest, thus permitting impurity effects to be described, or, if needed, spin states separated.IBM360; FORTRAN IV; OS/360; IBM360 and auxiliary storage (tape or disk) referred to as logical unit 9 in the program.

22464 (ANL/NESC—352R) RAUMZEIT; one-dimensional time-dependent diffusion calculations. Adams, C.H.; Stacey, W.M. (Knolls Atomic Power Lab., Schenectady, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048352.

Maxima of - 6 energy groups (6 coupled diffusion-type equations) 300 mesh points 40 different material compositions 6 delayed neutron groups.

RAUMZEIT solves systems of one-dimensional, time-dependent, multigroup diffusion-type equations using either of two treatments of the time dependence, finite differencing or the time-integrated approach (see reference 2).CDC6600; FORTRAN IV; SCOPE 2.0 or SCOPE 3.1; 64K memory.

22465 (ANL/NESC—355R) MC-2; fast neutron spectra & multigroup cross section. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy, J.H.; Stenberg, C.G. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048355.

The program uses variable dimensioning throughout so that computer storage requirements depend on a variety of problem parameters. Space requirements range from approximately 400K to 1000K bytes on IBM equipment depending on the complexity of the problem.

MC**2-2 solves the neutron slowing-down equations using basic neutron data derived from ENDF/B data files to determine spectra for use in generating multigroup neutron cross sections. The current edition includes the ability to treat all ENDF/B-V representations, high-order PL scattering representations, a free-format input processor, isotope mixing, delayed neutron processing, and flexibility in output data selection.IBM360,370;CDC7600; FORTRAN IV (99%) and Assembly language (1%) (IBM370), FORTRAN IV (99%) and COMPASS (1%) (CDC7600).; The IBM version of MC**2-2 may be executed under OS or VS operating systems and compiled using the FORTRAN H or program product compilers with the highest level of optimization. The CDC7600 version of MC**2-2 has been implemented on both the Lawrence Berkeley Laboratory and Brookhaven National Laboratory computers with their respective COKE/SCOPE operating systems. The SEGMENTATION LOADER is required and directly addressable LCM is used. The code was compiled using the FORTRAN Extended compiler under OPT=2 optimization; A large amount of fast peripheral storage is required. Storage requirements depend on problem complexity but virtually any reasonable problem may be executed on IBM equipment with 800K bytes or CDC equipment with 50,000 words of SCM and 100,000 words of directly addressable LCM..

22466 (ANL/NESC—358) TWOTRAN2; two-dimensional, multigroup transport in xy, rz, and r theta geometries. Lathrop, K.D.; Brinkley, F.W. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048358.

Variable dimensioning is used so that any combination of problem parameters leading to a container array less than MAXLEN can be accommodated. On IBM machines, TWOTRAN2 will execute in the 4-byte mode so that any combination of problem parameters leading to a container array less than MAXLEN can be accommodated. MAXLEN can be several hundred thousand and most problems can be core-contained. On the CDC machines MAXLEN can be slightly greater than 40,000 words and peripheral storage is used for most group-dependent data.

TWOTRAN2 solves the two-dimensional multigroup transport equation in (x,y), (r,theta), and (r,z) geometries. Both regular and adjoint, inhomogeneous and homogeneous (keff and eigenvalue searches) problems subject to vacuum, reflective, periodic, white or input-specified boundary flux conditions are solved. General anisotropic scattering is allowed and anisotropic inhomogeneous sources are permitted.CDC7600,6600;IBM360/195; FORTRAN IV; Five output units, five interface units (use of interface units is optional) and two system input/output units are required. A large bulk memory is desirable, but it can be replaced by disk, drum or tape storage..

22467 (ANL/NESC—359R) PUN1; unresolved resonance integral cross sections. Steen, N.M. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048359.

No more than 20 spin states per case and 54 energy groups are allowed. An arbitrary energy-weighting spectrum of up to 498 points may be used, but all points must be positive (w(e) greater than 0).

PUN1 evaluates unresolved radiative capture integrals and related multigroup cross sections. The unresolved distributions may have various orbital angular momentum quantum numbers and the effects of Doppler broadening and self-shielding are included.CDC6600; FORTRAN IV; SCOPE 3; 40,000 (octal) locations of central memory storage are required..

22468 (ANL/NESC—361) GLEN; group constant calculations from TOR output data. Clendenin, W.W. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048361.

A maximum of 87 energy points, and 20 groups in the collapsed structure are allowed. Each composition is limited to four heavy, non-moderating isotopes besides the moderator.

The GLEN program interpolates values of a factor proportional to the scattering law from the punched output of the TOR code (NESC Abstract 360). The differential cross section determined from these is integrated over the scattering angle to obtain coefficients of an expansion in Legendre polynomials of this angle for L = 0, 1, 2, 3. Integration over final energies yields values of the total scattering cross section and transport cross section. For each of a series of isotopic compositions (up to 10 compositions) the GLEN code calculates the diffusion length and values of the flux-weighted group average macroscopic scattering, absorption, fission, and transfer cross sections.CDC6600; FORTRAN IV; SCOPE; 64K memory.

22469 (ANL/NESC—368) **FLANGE2/71-1; ENDF/B thermal scattering data.** Honeck, H.C.; Finch, D.R. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048368.

Maximum energy groups = 200. Maximum Legendre order = 5.

FLANGE2 takes cross sections, angular distribution, resonance parameter, and thermal scattering law data from ENDF/B Format II or III data tapes and prepares thermal multigroup cross sections and scattering matrices.IBM360; FORTRAN IV; OS/360; 40K single-precision words of high-speed core plus 3 tape (or disk) units.

22470 (ANL/NESC—370) **GAKIT; one-dimensional, multigroup kinetics with temperature feedback.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Merrill, M.H. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048370.

One-dimensional kinetics calculation - maxima of - 10 prompt neutron energy groups 6 delayed neutron groups 10 homogeneous regions (channels) 100 mesh points Fuel element geometry for heat transfer calculation - In the axial direction the fuel element may consist of a bottom reflector, a core section, and a top reflector. The bottom and top reflectors must have uniform densities and uniform thermal properties, while within the core section of the fuel element up to five radial regions may be used. Maxima of - 15 radial mesh points 20 axial mesh points The fuel elements in all the channels must have the same geometry, the same thermal properties, and the same inlet temperature, but the fuel elements of different channels may have different coolant flow rates and different axial power shapes.

GAKIT solves the multigroup, one-dimensional, time-dependent diffusion theory kinetics equations including delayed neutron effects and temperature feedback based on two-dimensional heat transfer calculations. For the one-dimensional multigroup kinetics equations an arbitrary scattering matrix and arbitrary fission transfer are allowed, and plane, cylindrical, or spherical geometry can be used. A piecewise linear time-dependent inhomogeneous source can be specified. Feedback is available from xenon buildup and temperature dependence of cross sections. The heat transfer calculation is performed for two-dimensional r-z fuel element models assuming predetermined axial power shape functions and time-dependent power amplitudes obtained from the one-dimensional kinetics calculations. For the fuel elements average fuel and moderator temperatures are calculated which determine, based on tables, the temperature-dependent cross sections. Transients may be introduced by step changes of cross sections, by piecewise linear time-dependent cross sections (rod withdrawal accidents), by step changes of the flow rates or by step changes of the coolant inlet temperatures.UNIVAC1108; FORTRAN IV; EXEC2, GAX 23, but any other system with a segmenting facility can be used; 65,536 words of core storage and the facility for segmenting programs.

22471 (ANL/NESC—371R) **NOWIG; one-dimensional, two-group kinetics with temperature feedback.** Yasinsky, J.B. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048371.

NOWIG is used to solve the one-dimensional two-group neutron diffusion and delayed precursor equations using a shape-specified point-kinetics approximation. Feedback due to changes in the fuel metal temperature and coolant density is accounted for by using a model which is identical with that used in the WIGL2 (NESC Abstract 274) program.CDC6600; FORTRAN IV; SCOPE 3.1.

22472 (ANL/NESC—374) **1DX; one-dimensional diffusion fast cross section generation.** Hardie, R.W. (Pacific Northwest Lab., Richland, WA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048374.

1DX is a multipurpose, one-dimensional diffusion code for generating cross sections to be used in fast reactor analyses. The code is designed to - (a) compute and punch resonance shielded cross sections using data in the Russian (see reference 2) format, (b) compute and punch group-collapsed microscopic and/or macroscopic cross sections averaged over the spectrum in any specified zone, and (c) compute keff and perform criticality searches on time absorption, material concentrations, zone dimensions, and buckling using either a flux or an adjoint model.UNIVAC1108;IBM360,370; FORTRAN IV (UNIVAC1108), FORTRAN IV and BAL (IBM360,370); OS/360,370 (IBM360,370); 65K memory and 7 peripheral storage devices (UNIVAC1108), 145K and maximum of 8 storage devices (IBM360,370).

22473 (ANL/NESC—375) **SCORE3; SCISRS ENDF/B graphic cross section evaluation.** Dunford, C.L. (Atomics International Div., Canoga Park, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048375.

SCORE can display up to 500 experimental data points with their associated error bars. Up to 2 smooth curves may be overlayed on a display of experimental data points. Each curve is restricted to 150 points.

SCORE3 is an interactive neutron cross section evaluation system.IBM360; FORTRAN IV and BAL; OS/360, Version 14 or higher; IBM360 Model 50 or higher with 125,000 bytes of fast memory, an IBM2250 graphics console, Models 1, 2, or 3, 2 9-track tape drives, and 1 disk.

22474 (ANL/NESC—376) **AVERAGE; unresolved region average cross section calculations.** Bhat, M.R. (Brookhaven National Lab., Upton, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048376.

AVERAGE calculates average cross sections for up to 100 energy values in the unresolved region. It does not allow for inelastic scattering and calculates only s- and p-wave contributions. Width-fluctuation corrections can vary from 1 to 4.

AVERAGE calculates average scattering, capture, and fission cross sections from s- and p-wave data of the unresolved parameters of File 2 of ENDF/B.CDC6600; FORTRAN IV; SCOPE 2.0; 18K (octal) memory.

22475 (ANL/NESC—377) **SIGPLOT; resolved multilevel Briet-Wigner cross section calculations.** Bhat, M.R.; Cullen, D. (Brookhaven National Lab., Upton, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048377.

SIGPLOT can handle resonance data up to a maximum of 10 different isotopes with a total number of 500 resonances and an L value not exceeding five. It further assumes that the resolved resonance parameters are given for one energy range which is the same for all the isotopes of an element. The mesh points at which the cross sections are calculated can be varied. Since the calculated data are not stored, an increase in the number of mesh points does not conflict with any storage requirements.

SIGPLOT calculates the scattering, capture, fission, and total cross sections from resonance parameters of Version I data from File 2 of ENDF/B. Scattering cross sections may be calculated with or without level-level interference. Provision is also made to numerically Doppler-broaden any of the cross sections.CDC6600; FORTRAN IV; SCOPE 2.0; 37K (octal) memory.

22476 (ANL/NESC—380) **GATT; three-dimensional, few-group diffusion calculations in hexagonal geometries.** Kraetsch, H.; Wagner, M.R. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048380.

GATT allows downscattering from one group into the next and a maxima of - 81 z-planes 104,487 mesh points 4 energy groups 40 macroscopic cross section sets (mixtures) It is assumed that all fission neutrons are born in group 1.

GATT is a three-dimensional few-group neutron diffusion theory program for calculating the detailed spatial flux and power distribution for reactors with hexagonal core configuration. The program uses a uniform triangular mesh in the horizontal mesh planes and assumes a relatively simple region structure in the axial direction. It was designed to represent the special patch-type core structure of the HTGR reactor as closely as possible.UNIVAC1108; FORTRAN IV; EXEC2; 65K memory and 10 files of drum storage with a total of 500,000 words capacity.

22477 (ANL/NESC—384) **CHECKER;CRECT;DAMMET;PLOTFB; SLAVE3 ENDF/B V1 processing codes; CHECKER,CRECT,DAMMET,PLOTFB,... ENDF/B V1 proc.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Ozer, O. (Brookhaven National Lab., Upton, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048384.

In CHECKER correct structure of the data tape is assumed and minor anomalies are noted. Common and major irregularities cause termination of execution accompanied by a core dump. In CRECT correct sequence and material fields of the data tape are assumed. In both CHECKER and CRECT data must be in ENDF/B BCD standard arrangement card image format. In DAMMET a specific reaction cannot be extracted from a tape unless it is within a file or material selected.

This package of five programs is designed for processing ENDF/B (Evaluated Nuclear Data File Version B) Version I tapes. CHECKER checks that the ENDF/B tapes are in proper format and all fields are within specified limits, rather than the physics of the data library. Angular distributions reconstructed from Legendre coefficients are everywhere positive. CRECT, which can process ENDF/B Version III data as well as earlier versions, provides a means of correcting assembled data on a tape by insertion and deletion of data. DAMMET selectively merges data from one or two ENDF/B library tapes onto a final tape. The mode (BCD or binary) and arrangement (standard or alternate) may be changed during this process. PLOTFB processes ENDF/B library tapes which contain data embedded within a necessary library structure in order to produce comprehensive listings and/or plots. The listings and/or plots contain an extensive amount of information related to the data, such as temperature dependence, physical units of the data, interpolation laws for the data, cryptic titles defining the reaction type, etc. SLAVE3 provides modular subroutines which can be assembled to retrieve and process ENDF/B data for a specific problem.CDC6600; FORTRAN IV; SCOPE3 (locally modified); For CHECKER 56,300 octal (approximately 24,000 decimal) words of core storage and one tape (or disk) unit (besides input and output units). For CRECT 13,000 octal words of core storage and two data storage units. For DAMMET 61,000 octal (about 25,000 decimal) words of core storage and a maximum of five tape (or disk) units. For PLOTFB 73,700 octal (about 30,000 decimal) words of core storage and three tape (or disk) units. For SLAVE3 40,000 octal (approximately 18,000 decimal) words of core storage and one or two tape (or disk) units will be required for a typical job..

22478 (ANL/NESC—385) **COHBE;PREP; coherent inelastic scattering law calculations.** Borgonovi, G.M. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048385.

The programs, PREP and COHBE calculate the coherent one-phonon scattering law for polycrystalline beryllium, using an isotropic Debye-Waller factor as an approximation for beryllium. The Debye-Waller factor w is consistent with the definition exp**(-2*w*alpha) in the scattering law.UNIVAC1108; FORTRAN IV; EXEC2; 45K memory and 2 magnetic tapes.

22479 (ANL/NESC—387) **CITATION; one-, two-, and three-dimensional diffusion depletion using multigroup theory.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Cunningham, G.W. (Oak Ridge National Lab., TN (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048387.

CITATION has been designed to attack problems which can be run in a reasonable amount of time. Storage of data is allocated dynamically to give the user flexibility in dimensioning. Typically, a finite-difference diffusion problem could have 200 depleting zones, 10,000 nuclide densities, and 30,000 space-energy point flux values.

CITATION is designed to solve problems using the finite-difference representation of neutron diffusion theory, treating up to three space dimensions with arbitrary group-to-group scattering. X-y-z, theta-r-z, hexagonal-z, and triagonal-z geometries may be treated. Depletion problems may be solved and fuel managed for multicycle analysis. Extensive first-order perturbation results may be obtained given microscopic data and nuclide concentrations. Statics problems may be solved and perturbation results obtained with microscopic data.IBM360,303x; FORTRAN IV; OS/360; IBM360/91 or equivalent with at least 128,000 32-bit words of directly-addressable main storage, 7 to 32 I/O devices depending upon the calculation, excluding input and output devices and system requirements..

22480 (ANL/NESC—388) **ETOX3; multigroup constants from ENDF/B for one dimension.** Kidman, R.B. (Hanford Engineering Development Lab., Richland, WA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048388.

ETOX3 (ENDF/B to 1DX) calculates multigroup constants for nuclear reactor calculations using data from the Evaluated Nuclear Data File (ENDF/B) Version II or Version III format. It can also process Version I materials that do not call for partial energy distribution laws 1, 2, 4, 6, or 8 (see END/F, File 5). The code is designed to compute and punch - (a) infinite dilute cross sections, (b) temperature-dependent, self-shielding factors for arbi- trary values of microscopic sigmao (total cross section per atom) in the Russian (Bondarenko) format, and (c) inelastic-scattering probability matrices.UNIVAC1108;IBM360,370; FORTRAN IV; Five tape units or equivalent random-access storage devices are required (3 are scratch units). The UNIVAC1108 version uses 65K words and IBM360,370 300K bytes of main memory..

22481 (ANL/NESC—389R) **STINT3; single-channel space-time synthesis.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy, J.H.; Stacey, W.M. (Knolls Atomic Power Lab., Schenectady, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048389.

Maxima of - 6 equations (groups * modes) 50 axial mesh intervals 6 delayed neutron groups 40 control rod and temperature feedback channels.

STINT3 solves static (eigenvalue) and time-dependent systems of coupled, one-dimensional, diffusion-type equations in slab geometry and is primarily intended for solving single-channel, flux-synthesis equations. The code provides for control rod motion and temperature feedback.CDC6600; FORTRAN IV; SCOPE 3.1; 64K memory.

22482 (ANL/NESC—398R) **BE21; few-group, discrete ordinates for slab geometry.** Schmidt, E. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048398.

The maximum number of ordinates is 60 which may be divided arbitrarily among the groups subject to the restriction that the ordinate schemes be symmetric about, but not include, mu=0 in each group. The corresponding group number limit is 30 with two ordinates per group. Other limitations include - 20 compositions 50 regions 50 source regions.

BE21 solves the few-group discrete ordinates equations in slab geometry. Either homogeneous or inhomogeneous problems can be solved.CDC6600; FORTRAN IV; SCOPE 3.1; 140,000 (octal) locations of fast memory and 2 scratch tapes.

22483 (ANL/NESC—399R) **SUMOR;m0271; s-wave neutron cross section calculation.** Harris, D.R.; Noll, C.B. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048399.

Level-level interference is not permitted in fission channels. SUMOR treats s-wave channels only, and potential cross section is approximated as independent of energy.

SUMOR calculates s-wave neutron cross sections at selected energies. The cross sections are calculated in three approximations to r-matrix theory - the Reich-Moore approximation, the Feshbach, Porter, and Weisskopf approximation, and the sums of single-level formulae approximation. These calculated cross sections or, alternatively, input lists of cross sections, are Doppler-broadened using exact calculation for target nucleii in Maxwellian motion. Calculated cross sections or cross sections divided by neutron energy can be integrated between arbitrary energy limits.CDC6600; FORTRAN IV; SCOPE 3.1; SUMOR requires approximately 135,000 (octal) central memory locations. The number of central memory words could be decreased by decreasing the dimensions of the output cross sections. Also, one input and at least three output devices are required..

22484 (ANL/NESC—401) **GAMTRI; two-dimensional, multigroup, diffusion triangular mesh geometries.** Dorsey, J.P.; Froehlich, R. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048401.

Maxima of - 10 energy groups 20,000 space mesh points 255 different material regions.

The homogeneous two-dimensional multigroup diffusion theory equations with arbitrary group-to-group scattering and arbitrary fission transfer are solved for heterogeneous assemblies in (uniform mesh) triangular geometry. Homogeneous logarithmic boundary conditions are used at the outer surface of non-diffusion regions. The results include the group- and point-dependent neutron fluxes, the power distribution, the neutron multiplication factor, and a detailed neutron balance.UNIVAC1108; FORTRAN IV (90%) and Assembly language (10%); EXEC2, General Atomic Version GAX 23; 65,536 words of core storage, 3 tape units on 1 data channel, 1,572,864 words of drum storage from 1 data channel, and a peripheral printer-punch..

22485 (ANL/NESC—405) **NOAH; one-dimensional, one-group space-time diffusion feedback.** Lellouche, G.S. (Brookhaven National Lab., Upton, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048405.

Maxima of - 6 groups of delayed neutrons 10 regions 500 space points A new region is required when the feedback free value of any of the parameters is changed from the preceding region value.

NOAH solves the one-dimensional, one-group space-time diffusion equation accounting for the effects of fuel, clad, and coolant temperatures (or by changing subroutines fuel, coolant, and solid moderator temperatures) on fission and absorption cross sections, and on the diffusion coefficient and the transverse buckling. It can account for the effects of xenon-iodine feedback. If desired, it will determine long-time xenon-flux behavior assuming the temperatures to be in quasi-static equilibrium. Numerous methods of perturbation are allowed and control of the transient is also provided.CDC6600; FORTRAN IV; SCOPE 2 or 3; 27K memory.

22486 (ANL/NESC—409) **LARCA; flux-weighting of DTF4 cross sections.** Anderson, R.C. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048409.

Maxima of - 25 groups 13 reactions per group 20 zones 36 materials.

Multigroup cross sections are weighted by the flux in the appropriate groups and regions, and cross sections for the assembly are computed and punched in DTF4 format. The program also computes the infinite medium flux, reaction rates, and the infinite multiplication factor and material buckling.CDC6600; FORTRAN IV; SCOPE; 63,000 (octal) storage.

22487 (ANL/NESC—410) **TACASI; analysis of resonance measurements.** Friesenhahn, S. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048410.

As many as 16 observed quantities may be input and as many as 24 subresonances may be included.

TACASI is used to determine the parameters of a single neutron resonance. The code accepts measured values of capture areas, self-indication areas, self-indication ratios and transmission areas and their associated uncertainties in any combination and determines best estimates of the neutron and radiation widths and their standard deviations.UNIVAC1108; FORTRAN IV; EXEC2; 65K memory.

22488 (ANL/NESC—416) **PARTI; optimal group or mesh collapsing.** Harms, A.A. (McMaster Univ., Hamilton, Ontario (Canada). Dept. of Engineering Physics). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048416.

PARTI will optimize the discrete representation of an arbitrary function of one or two independent variables.

PARTI is a group collapsing code which determines the optimum discrete representation of a variable for subsequent repetitive calculations.CDC6500; FORTRAN IV; SCOPE; 32K memory.

22489 (ANL/NESC—426R) **PAX03; harmony-PDQ cross section generation code.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy, J.H.; Kovscek, S.E. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048426.

Maxima of - 30 cells calculated in one problem 30 nuclides represented in the fast energy spectrum 50 nuclides used in other parts of the program 4 fast groups with 1 thermal group or 3 fast groups with 2 overlapping thermal groups 3 perturbed parameters in the temperature feedback calcula- tions unlimited number of depletion times.

PAX03 performs infinite medium, time-dependent calculations of neutron flux spectra in homogeneous, hydrogenous media. A HARMONY file containing few-group microscopic and/or macroscopic cross sections for PDQ7 problems may be generated. The one-dimensional multigroup transport equation may be solved using a P1 to P7 approximation in rectangular, cylindrical, or spherical geometry. Heterogeneous resonance integrals and thermal shielding factors are calculated for either plate or rod geometry. Blackness parameters are calculated and coefficients for temperature feedback calculations are obtained. Few-group constants are available in both the fast and thermal energy ranges.CDC6600; FORTRAN IV and COMPASS; SCOPE 3; System disk, dedicated disk area for Bettis file manager, extended core storage (ECS) for auxiliary storage.

22490 (ANL/NESC—429R) ASPIS; gamma-ray source buildup factor calculations. Lois, L. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048429.

Maxima of - 12 regions 151 spatial mesh points per region 650 total spatial mesh points 10 material compositions 10 MeV maximum energy 251 total energy mesh points 13 energy groups 6 terms in the double range Legendre polynomial expansion of the flux 6 terms in the Legendre polynomial expansion of the scattering kernel.

ASPIS computes the energy, dose and energy deposition buildup factors for monoenergetic gamma rays for a plane isotropic, plane monodirectional, or plane slant source, in an arbitrary laminar array.CDC6600; FORTRAN IV and ASCENT; SCOPE 3.1; 140K (octal) memory and 3 tapes for scratch storage.

22491 (ANL/NESC—430) GAZE2; one-dimensional multigroup diffusion in slab, spherical, and cylindrical geometries. Lenihan, S.R. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048430.

GAZE2 is a one-dimensional, multigroup, neutron diffusion theory program. It includes all four of the standard one-dimensional geometries - slab, sphere, radial cylinder, and axial cylinder, the last of which is identical to slab geometry except when the ZOOM albedo-type transverse boundary condition is used.UNIVAC1108; FORTRAN IV (95%) and Assembly language (5%); EXEC2.

22492 (ANL/NESC—431) SUPERTOG; ENDF/B fine-group constants generation. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Craven, C.W. (Oak Ridge National Lab., TN (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048431.

SUPERTOG accepts nuclear data in either a point by point or parametric representation as specified by ENDF/B. This data is averaged over each specified group width. The explicit assumption is made that the flux per unit lethargy is constant or that a suitable weight function will be supplied by the user. When resonance data is available, resolved and unresolved resonance contributions are calculated and used as specified by input options. Fine group constants such as one-dimensional reaction arrays (absorption, fission, etc.), PN elastic scattering matrices, and inelastic and (n,2n) scattering matrices are generated and placed on tapes in formats suitable for use by the GAM1, GAM2, ANISN, or DOT programs.IBM360; FORTRAN IV (ANSI FORTRAN); OS/360; 65K memory, 6 scratch disks, and 1 tape.

22493 (ANL/NESC—436) ETOM1; ENDF/B format to MUFT format cross sections. Dannels, R.A.; Kusner, D.E. (Westinghouse Electric Corp., Pittsburgh, PA (USA). Nuclear Energy Systems Div.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048436.

ETOM1 processes basic nuclear information given in the ENDF/B format and produces data decks for use in generation of MUFT4 and MUFT5 libraries.CDC6600; FORTRAN IV; SCOPE 3.1; 43,000 (decimal) locations with 2 tapes (scratch tape and library tape).

22494 (ANL/NESC—437) ETOG1; ENDF/B to MUFT, GAM, ANISN corss sections format. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Kellman, S. (Westinghouse Electric Corp., Pittsburgh, PA (USA). Nuclear Energy Systems Div.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048437.

ETOG1 processes basic nuclear information given in the ENDF/B format and produces data decks for use in generation of MUFT4, MUFT5, GAM1, GAM2, and ANISN libraries.CDC6600; FORTRAN IV; SCOPE 3.1; 55,000 decimal locations and 4 scratch tapes in addition to the library tape and standard input, output, and punch units.

22495 (ANL/NESC—438) BUG2; two-dimensional multigroup diffusion & burnup in xy, rz geometries. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Todt, F. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048438.

Maxima of - 10 groups 20,000 space mesh points 255 regions 300 subregions 40 total nuclides 25 heavy nuclides 25 fission products and other burnable nuclides.

The two-dimensional, multigroup, neutron diffusion equations for x-y or r-z geometry are solved to obtain the multiplication factor and the spatial flux and power distributions. Complete reactor life histories with partial refueling at a number of reload points can be calculated. The depletion scheme of all burnable nuclides is specified by the user at execution time. A regionwide depletion scheme is used. Concentration dependent self-shielding factors may be applied to any nuclide.UNIVAC1108; FORTRAN IV and Assembly language; EXEC2, GAX23; 65,536 words of core storage, 2 million words of drum storage on one data channel, 3 tape units, and a peripheral printer.

22496 (ANL/NESC—439) BUGTRI; two-dimensional multigroup diffusion & burnup in triangular geometries. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Todt, F. (General Atomic Co., San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048439.

Maxima of - 10 groups 20,000 space mesh points 255 regions 300 subregions 40 total nuclides 25 heavy nuclides 25 fission products and other burnable nuclides.

The 2-dimensional multigroup, neutron diffusion theory equations for triangular geometry are solved to obtain the multiplication factor and the spatial flux and power distributions. Complete reactor life histories with partial refueling at a number of reload time-points can be calculated. The depletion scheme of all burnable nuclides is specified by the user at execution time. A regionwise depletion scheme is used. Concentration dependent self-shielding factors may be applied to any nuclide.UNIVAC1108; FORTRAN IV and Assembly language; EXEC2, GAX23; 65,536 words of core storage, 2 million words of drum storage on one data channel, 3 tape units, and a peripheral printer.

22497 (ANL/NESC—453) **RICE; primary recoil atom spectra ENDF/B data.** Jenkins, J.D. (Oak Ridge National Lab., TN (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048453.

RICE does not recognize all of the multiplicity of data formats allowed by ENDF/B. It is programmed to accept the most prevalent formats. In addition, the neutron energy distribution is restricted to a 99-group representation and the recoil energies are represented by 200 energy groups.

The program calculates an energy exchange matrix which describes the probability that a neutron with energy E will produce a recoil atom with energy T in a given material. In addition, the program can calculate the primary recoil atom energy spectrum for a given neutron spectrum, the damage cross section for the material, and an optimum lower energy limit for use in comparing the relative damage in different reactor spectra. The program accepts neutron scattering data directly from the ENDF/B library tapes and, in the case of a resonance nuclide, from a tape generated by the program SUPERTOG.IBM360; FORTRAN IV; OS/360; 110,000 words of core storage and five I/O devices other than normal input/output.

22498 (ANL/NESC—459) **DOT2DB; 2-dimensional multigroup diffusion & SN theory.** Protsik, R.; Leff, E.G. (General Electric Co., Sunnyvale, CA (USA). Breeder Reactor Development Operation). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048459.

DOT2DB solves both the multigroup, discrete ordinates transport theory and the multigroup, diffusion theory equations in two dimensions. Anisotropic scattering of any order Legendre expansion is allowed in the transport theory option. Anisotropic scattering in the diffusion theory option is treated with the transport approximation, using the P1 scattering matrix, when provided, to calculate the transport cross section. Options include solutions in (x,y), (r,z), (r,theta), and, in the diffusion theory option, triangular geometries. Both direct and adjoint fluxes may be computed for fixed volume-distributed source, multiplication-constant iteration, time-absorption iteration, concentration search, zone-thickness search, and fixed-boundary source problems. In addition to the fixed-boundary source problem, options include vacuum, reflection, periodic and white boundary conditions. Cross sections may be entered from cards or from tape in the DTF format. Activities for any material in the system may be output by interval (optional) and zone. Other output includes the interval fluxes and sources and a reaction summary table for each zone and for the system.GE635; FORTRAN IV; GECOS-III; 45K memory, 3 to 8 scratch files and a cross-section library file.

22499 (ANL/NESC—462R) **SPAN4; a point-kernel shield evaluation code.** Wallace, O.J. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048462.

SPAN4 calculates the fast neutron dose rate, thermal neutron flux, gamma-ray flux, dose rate, and energy-absorption rate in rectangular, cylindrical, and spherical geometries by integrating appropriate exponential kernels over a source distribution. The shield configuration is flexible--a first-level shield mesh, using any one of the three geometries, is specified. Regions of this same geometry or of other geometries, having their own (finer) meshes, may then be embedded between the first-level mesh lines, defining second-level shield meshes. This process is telescopic--third-level shield meshes may be embedded between second-level meshlines in turn. All meshes may have variable spacing. Sources and detectors may be located arbitrarily with respect to any shield mesh. The source is defined by the function: s=s0+s1(a)*s2(b)*s3(c)+s4(a,b)*s3(c)+s5(a,c)*s2(b)+s6(b,c) *s1(a)+s7(a,b,c) where a, b, and c represent coordinates. If any factor is missing, the corresponding terms are zero. Cross sections, buildup factors, standard compositions, energy structures, dose-conversion factors, infinite line and infinite plane source kernels, and quadratures are contained in a library of approximately 10,000 items.CDC6600; FORTRAN IV and ASCENT; SCOPE 3.1; 64K central memory and one system disk. Microfilm is required if the plot options are to be used.

22500 (ANL/NESC—469) **PMS1; fast neutron polarization experiment.** Morrison, G.W. (Oak Ridge National Lab., TN (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048469.

No more than five collisions are allowed and liquid helium must be the polarizer analyzer. The total number of energy points for which phase shifts are given must be less than 100.

PMS1 corrects experimental fast neutron polarization data for finite geometry and multiple scattering effects, when liquid helium is the polarizer analyzer.IBM360; FORTRAN IV(H) and BAL; OS/360; 32K memory.

22501 (ANL/NESC—476) **CAGE;BIRD;SPEC; time-of-flight data analysis.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Young, J.C. (Gulf Radiation Technology, San Diego, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048476.

A maximum of 35 groups for the multigroup calculation for CAGE and BIRD. Deadtime correction routines of SPEC are designed for TMC 201, 211, and 212 1024-channel analyzers and for an on-line CDC1700.

CAGE/BIRD/SPEC is a package of three independent codes designed for the reduction and processing of neutron time-of-flight spectra in pulsed multiplying or non-multiplying assemblies.UNIVAC1108; FORTRAN V; EXEC8; 64K memory and one 100K area of fast drum for CAGE and BIRD. 50K memory, 2 scratch files and, on option, several input/output files for SPEC.

22502 (ANL/NESC—491) **MOD5; stochastic model of neutron slowing-down.** Williamson, T.J. (Naval Postgraduate School, Monterey, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048491.

MOD5 calculates the time- and energy-dependent evolution of the neutron density in homogeneous media following initiation of a) a monoenergetic source distributed over a finite time interval, or b) a source of arbitrary spectrum with a delta-function distribution in time. Effectively the code produces Green's function solutions to the slowing-down equation in discrete numerical form. Leakage is treated in the diffusion approximation. The program a) calculates spectra and energy moments at selected times following the burst of source neutrons, b) evaluates the time-dependent neutron density and slowing-down density at selected energies and computes moments of these densities, c) calculates time-dependent distributions of capture, leakage and first fission, and moments of these distributions, d) calculates steady-state central core neutron flux and leakage flux in detail and in group-averaged form, and e) calculates parameters such as keff.IBM360; FORTRAN IV; IBM360 CP-CMS; 175K bytes memory, normal input, output, program, and punch units, 6 cylinders of IBM2314 or equivalent direct-access storage.

22503 (ANL/NESC—492) RAMP1; Reich-Moore resolved region cross-sections. Bhat, M.R. (Brookhaven National Lab., Upton, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048492.

The program assumes that the resolved resonance parameters are given for a single energy range for all isotopes and can handle resonance data up to a maximum of 10 different isotopes with a total of 500 resonances over all isotope energy ranges and L values and an L value not exceeding 5.

RAMP1 calculates scattering, capture, fission, and total cross sections from Reich-Moore resolved resonance parameters. The resonance parameters are assumed to be in ENDF/B Version II data format. Cross sections may be Doppler-broadened if so desired.CDC6600; FORTRAN IV; SCOPE 3.0; 40K (octal) memory.

22504 (ANL/NESC—506R) JP1XR; coupled-channel scattering cross section calculations. Slavik, C.J. (Knolls Atomic Power Lab., Schenectady, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048506.

Maximum of - 100 angles for which the differential quantities (cross section and polarization) are to be computed.

JP1XR computes scattering cross sections and related quantities for the scattering of nucleons or composite particles from any collective nucleus, even or odd A, vibrational or rotational. The projectile can be charged or uncharged and can have spin 0, 1/2, or 1.CDC6600; FORTRAN IV.

22505 (ANL/NESC—507R) PHASER; phase shift cross section and polarization calculations. Slavik, C.J. (Knolls Atomic Power Lab., Schenectady, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048507.

Maximum of - 15 states to be considered in the Hauser-Feshbach calculation.

PHASER computes the following quantities for the scattering of neutrons from nuclei: total, elastic, and reaction cross sections, differential shape and compound elastic cross sections, differential polarizations, differential and integrated compound level inelastic cross sections, compound and shape elastic Legendre moments in the center-of-mass system.CDC6600; FORTRAN IV; SCOPE.

22506 (ANL/NESC—543) ENDF/B-THERMOS; 30-group ENDF/B scattering kernels. McCrosson, F.J.; Finch, D.R. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048543.

These data are 30-group THERMOS thermal scattering kernels for P0 to P5 Legendre orders for every temperature of every material from s(alpha,beta) data stored in the ENDF/B library. These scattering kernels were generated using the FLANGE2 computer code. To test the kernels, the integral properties of each set of kernels were determined by a precision integration of the diffusion length equation and compared to experimental measurements of these properties. In general, the agreement was very good. Details of the methods used and results obtained are contained in the reference. The scattering kernels are organized into a two volume magnetic tape library from which they may be retrieved easily for use in any 30-group THERMOS library. The contents of the tapes are as follows - VOLUME I Material ZA Temperatures (degrees K) Molecular H2O 100.0 296, 350, 400, 450, 500, 600, 800, 1000 Molecular D2O 101.0 296, 350, 400, 450, 500, 600, 800, 1000 Graphite 6000.0 296, 400, 500, 600, 700, 800, 1000, 1200, 1600, 2000 Polyethylene 205.0 296, 350 Benzene 106.0 296, 350, 400, 450, 500, 600, 800, 1000 VOLUME II Material ZA Temperatures (degrees K) Zr bound in ZrHx 203.0 296, 400, 500, 600, 700, 800, 1000, 1200 H bound in ZrHx 230.0 296, 400, 500, 600, 700, 800, 1000, 1200 Beryllium-9 4009.0 296, 400, 500, 600, 700, 800, 1000, 1200 Beryllium Oxide 200.0 296, 400, 500, 600, 700, 800, 1000, 1200 Uranium Dioxide 207.0 296, 400, 500, 600, 700, 800, 1000, 1200Auxiliary program written in FORTRAN IV; The retrieval program requires 1 tape drive and a small amount of high-speed core.

22507 (ANL/NESC—851) MINX; multigroup crosssections from ENDF/B-IV data. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Kidman, R.B. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048851.

The principal restriction is the computing time available for a given desired accuracy. Because of the need to partition the very large energy versus cross section tabulations in the point-wise library, extensive use is made of the BCD form of the ENDF data. For large problems requiring high accuracy, use of the BCD ENDF format can lead to excessive I/O transfers.

MINX calculates fine-group averaged infinitely-dilute cross sections and self-shielding factors from ENDF/B-IV (reference 2) data. Its primary purpose is to generate a pseudo-composition independent multigroup library for input to the SPHINX (reference 3) space-energy collapse program using CCCC-III (reference 4) standard interfaces. MINX incorporates and improves upon the resonance capabilities of existing codes such as ETOX (reference 5) and ENDRUN (reference 6) and the high-order group-to-group transfer matrices of SUPERTOG (reference 7) and ETOG (reference 8). Fine-group energy boundaries, Legendre expansion order, gross spectral shape component in the Bondarenko (reference 9) flux model, temperatures, and dilutions can all be user-specified.CDC7600;IBM370; FORTRAN IV (H compiler) and BAL (IBM370), FORTRAN IV (RUN or FTN compiler) and COMPASS (CDC7600); OS/370 (IBM370), SCOPE (CDC7600); Storage requirements depend on characteristics of the problem. The 50-group library problem with overlay on the IBM370 requires approximately 330K bytes of memory. NESC tested this problem without overlay using 610K bytes on an IBM370/195. NESC execution of the CDC7600 sample problem required about 127,000 (octal) words of storage.

22508 (ANL/NESC—861) FESH; x-y multi-group neutron transport method. Blomquist, R.N. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048861.

Sources and scattering are assumed to be isotropic; up-scattering is not allowed. Flexible dimensioning permits combinations of problem parameters to occupy an array of 50,000 words. Most group-dependent data is stored in extended core storage (ECS).

FESH solves the spherical harmonics approximation to the second-order multigroup neutron transport equation in two dimensions. A three-dimensional spherical harmonics approximation of user-specified order is applied to the angular variable and two-dimensional spatial finite elements to the spatial variable. Scattering is assumed to be isotropic. Either multiplication eigenvalue problems or subcritical inhomogeneous source problems can be solved with several combinations of vacuum and reflective boundary conditions possible.CDC6600,7600; FORTRAN IV (MNF, University of Minnesota FORTRAN); SCOPE; 200,000 (octal) words of central memory and 142,000 (octal) words of ECS are needed to execute the program. Central memory requirements for single precision arithmetic may be estimated as (45M+10) * (L(L+1)/2)**2 + NSP*((L(L+1)/2)+2) words, where M is the number of material regions, L is the order of the spherical harmonics approximation, and NSP is the number of spatial mesh points.

22509 (ANL/NESC—862) FX2-TH; two-dimensional time-dependent reactor kinetics. Shober, R.A.; Daly, T.A. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048862.

Variable dimensioning is used throughout the program so that computer storage requirements depend on a variety of problem parameters. The amount of memory required can range from 300K bytes for a small problem up to the maximum limit of computer storage for very large problems.

FX2-TH solves the steady-state and time-dependent two-dimensional multigroup neutron diffusion equations with thermal and hydraulic feedback. The following geometry options are available: x, r, x-y, r-z, theta-r, and triangular. FX2-TH contains two basic thermal and hydraulic models: a simple adiabatic fuel temperature calculation and a more detailed model consisting of an explicit representation of fuel pin, gap, clad, and coolant. FX2-TH allows feedback effects from both fuel temperature (Doppler) and coolant temperature (density) changes. The code is designed for nuclear reactor transient analysis.IBM370,303X; FORTRAN IV (99%) and Assembly language (1%); OS/370; FX2-TH will dynamically allocate problem variables either on disk or in computer memory depending on the total amount of computer memory available. For any problem, a certain minimum amount of memory is required; this amount is dependent on the size of the problem. In general, FX2-TH operates more efficiently if sufficient computer memory is available to retain most of the problem variables permanently. The sample problem executed by NESC required 900K bytes of memory.

22510 (ANL/NESC—870R) BNWIGL;UNIWIGL; two-group time-dependent one-dimensional diffusion. Heeb, C.M. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048870.

The total storage set aside for all parameters is 16,000 words for the CDC6600 version and 12,000 for the UNIVAC1108 version. Storage is dynamically allocated permitting the user to establish trade-offs in use of spatial detail, numbers of materials, and delayed neutron groups.

BNWIGL and UNIWIGL solve the one-dimensional, two-energy group, time-dependent diffusion theory equation with thermal feedback. The stand-alone, one-dimensional, steady-state diffusion theory code, HFN, is incorporated to perform critical searches and to determine the initial direct and adjoint fluxes for input to the time-dependent calculation. Problems in slab, cylindrical, and spherical geometries with up to six delayed neutron groups can be solved. Thermal feedback is introduced through the solution of the non-boiling heat transfer equations. Transients can be initiated either from changes in the thermal-hydraulic parameters or by simulated control rod movement in either of the two independent pseudo-rod models. Effects of two and three dimensions can be simulated through the use of interpolation tables for control rod worths and Doppler weighting factors.UNIVAC1108,1100;CDC6600; FORTRAN (99%) and COMPASS (1%) (CDC6600), FORTRAN V (UNIVAC1108); SCOPE 3.4.4 (CDC6600), EXEC8 (UNIVAC1108); If the programs are segmented, 154,000 (octal) words of memory are required for execution of UNIWIGL (CDC6600), and 51,000 words of memory are required for BNWIGL (UNIVAC1108).

22511 (ANL/NESC—878) APARNA2; one-dimensional integral neutron transport in slab geometries. Vaidyanathan, R. (Reactor Research Centre, Kalpakkam (India). Reactor Physics Section). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048878.

The problem size is restricted by memory size. The system is assumed to be non-regenerative. The boundary conditions are arbitrary incoming flux at the left boundary with the right boundary assumed non-reentrant. In addition, extraneous sources can be distributed inside the medium.

APARNA2 solves the one-dimensional integral neutron transport equation with anisotropic scattering in slab geometry.IBM370,303x; FORTRAN IV; OS/370; 400K bytes of memory are required.

22512 (ANL/NESC—880) ACSAP; resonance region cross section analysis. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Young, R.C. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048880.

Maxima of - 250 resonances 100 resonance parameters which can be adjusted simultaneously 25 different isotopes 20 points to be fit in valleys between resonances ACSAP does not adjust the alignment of interfering resonances and the signs of the interference terms. The program returns appreciable errors when used with light nuclides.

ACSAP may be used to compute neutron cross section data from neutron resonance input. Total, fission, capture, or scattering cross section data may be computed. Experimental data may be compared by means of a wide selection of representations. ACSAP can also determine cross section resonance parameters from input experimental data.IBM360,370,303x; FORTRAN IV (92%) and BAL (8%); OS/360,370; 230K bytes of memory are needed for execution of the program; additional memory is required if plotting is desired. Three direct access devices are used to store temporarily calculated theoretical cross sections (logical unit 10), experimental data (unit 11), and difference tables (unit 12).

22513 (ANL/NESC—883) NJOY; neutron & photon crosssections from ENDF/B. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Boicourt, R.M. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048883.

The NJOY nuclear data processing system is a comprehensive set of processing modules for producing pointwise and multigroup cross sections for neutron and photon transport calculations from ENDF/B-IV and -V evaluated nuclear data. Each module performs a well-defined processing task. RECONR reconstructs pointwise (energy-dependent) cross sections from ENDF/B resonance parameters and interpolation schemes. BROADR Doppler-broadens and thins pointwise cross sections. UNRESR computes effective self-shielded pointwise cross sections in the unresolved-resonance region. HEATR generates pointwise heat production cross sections (kerma factors) and radiation-damage-energy production cross sections. THERMR produces incoherent inelastic energy-to-energy matrices for free or bound scatterers, coherent elastic cross sections for hexagonal materials, and incoherent elastic cross sections. GROUPR generates self-shielded multigroup cross sections, group-to-group neutron scattering matrices, and photon production matrices from pointwise input. GAMINR calculates multigroup photon interaction cross sections and kerma factors and group-to-group photon scattering matrices. ERRORR produces multigroup covariance matrices from ENDF/B uncertainties. COVR reads the ERRORR output and performs covariance plotting and output formatting. DTFR formats multigroup data for use in transport codes, such as DTF4 and ANISN. CCCCR formats multigroup data for the CCCC standard interface files ISOTXS, BRKOXS, and DLAYXS. MATXSR formats multigroup data for the cross section interface file MATXS. MODER changes ENDF/B and ENDF-like NJOY interface files from formatted decimal format (BCD or ASCII) into a blocked binary format and back. The ACER module prepares libraries for the Los Alamos continuous-energy Monte Carlo code MCNP, and POWR prepares libraries for the proprietary EPRI-CELL and EPRI-CPM power reactor fuel-cycle codes.

22514 (ANL/NESC—899) ANGCOR; directional correlation coefficients. Ruhter, W.D. (Lawrence Livermore National Lab., CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048899.

Input is restricted to no more than ten angles. Correlations are limited to successive gamma-ray cascades.

ANGCOR calculates gamma-gamma directional correlation coefficients and mixing ratios. The program allows the user to compare experimental correlations with theoretical expectations and to simulate data for experimental analysis.CDC6600,7600; FORTRAN IV; SCOPE 3.4 and INTERCOM 4.5 (CDC6600), SCOPE 2.1 (CDC7600); 26,500 (octal) words of memory are required for batch-mode processing, 55,000 (octal) words of memory for interactive operation.

22515 (ANL/NESC—933R) **SCAP; point kernel single or albedo scatter.** Disney, R.K.; Bevan, S.E. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048933.

The geometric zone description is restricted to zones defined by boundary surfaces defined by the general quadratic equation or one of its degenerate forms. Due to flexible dimensioning in SCAP, there are no restrictions on the number of energy groups or geometric zones.

SCAP solves for radiation transport in complex geometries using the single- or albedo-scatter point kernel method. The program is designed to calculate the neutron or gamma-ray radiation level at detector points located within or outside a complex radiation scatter source geometry or a user-specified discrete scattering volume. The geometry is described by zones bounded by intersecting quadratic surfaces with an arbitrary maximum number of boundary surfaces per zone. The anisotropic point sources are described as point-wise energy dependent distributions of polar angles on a meridian; isotropic point sources may be specified also. The attenuation function for gamma rays is an exponential function on the primary source leg and the scatter leg with a buildup factor approximation to account for multiple scatter on the scatter leg. The neutron attenuation function is an exponential function using neutron removal cross sections on the primary source leg and scatter leg. Line or volumetric sources can be represented as distributions of isotropic point sources, with uncollided line-of-sight attenuation and buildup calculated between each source point and the detector point.CDC7600,CYBER175; FORTRAN (99%) and COMPASS (1%); SCOPE 2.1 (CDC7600), NOS 1.3 (CDC CYBER175); 55,000 (octal) words of memory are needed to execute the SCAP program on the CDC CYBER175.

22516 **(CONF-811145—16) Neutron-source characterization and radiation-damage calculations for material studies.** Greenwood, L.R. (Argonne National Lab., IL (USA)). 9 Nov 1981. Contract W-31-109-ENG-38. 15p. NTIS, PC A02/MF A01. Order Number DE83007857.

From International conference on neutron irradiation effects; Argonne, IL, USA (9 Nov 1981).

In our quest to understand radiation damage in materials, it is vital that we characterize radiation sources in terms of neutron flux and spectra as well as the more-fundamental displacement damage, gas production, and transmutation rates. Such data are crucial to correlations of materials-property changes in different environments and to predictions of materials performance in inaccessible environments, such as fusion reactors. Dosimetry techniques have been developed to measure the neutron flux and spectra in diverse facilities including thermal, fast, and mixed reactors, T (d,n) and Be (d,n) accelerator sources, and high-energy spallation sources. Displacement-damage cross sections have been calculated for 36 elements spanning the periodic table. All of these exposure parameters can now be routinely measured with 10 to 15% relative accuracy at all existing radiation-effect facilities. 4 tables.

22517 (INIS-mf—7432, pp vp) **Renninger effect in neutron diffraction by distorted single crystal.** Vrana, M.; Mikula, P.; Michalec, R.T. (Ceskoslovenska Akademie Ved, Rez. Ustav Jaderne Fyziky:. [nd]. (In Czech). NTIS (US Sales Only), PC A06/MF A01.

From 6. conference of Czechoslovak physicists; Ostrava, Czechoslovakia (27 Aug 1979).

22518 (INIS-mf—7432, pp vp) **Time-of-flight study of neutron diffraction by perfect single crystals.** Aleksandrov, Yu.A.; Machekhina, T.A.; Michalec, R.T.; Sedlakova, L.N. (Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Neutron Physics). [nd]. (In Czech). NTIS (US Sales Only), PC A06/MF A01.

From 6. conference of Czechoslovak physicists; Ostrava, Czechoslovakia (27 Aug 1979).

22519 (INIS-mf—7432, pp vp) **Visualization of crystal defects by neutron diffraction topography.** Chalupa, B.; Vrana, M. (Ceskoslovenska Akademie Ved, Rez. Ustav Jaderne Fyziky:. [nd]. (In Czech). NTIS (US Sales Only), PC A06/MF A01.

From 6. conference of Czechoslovak physicists; Ostrava, Czechoslovakia (27 Aug 1979).

22520 (INIS-mf—7432, pp vp) **Effect of multiple deuteron scattering on neutron spectrum of d+T generator.** Kozma, P.; Vincour, J.; Bem, P. (Ceskoslovenska Akademie Ved, Rez. Ustav Jaderne Fyziky:. [nd]. (In Czech). NTIS (US Sales Only), PC A06/MF A01.

From 6. conference of Czechoslovak physicists; Ostrava, Czechoslovakia (27 Aug 1979).

22521 **(PB—82-236860) White source use in a neutron standards laboratory. Final report.** Bowman, C.D.; Carlson, A.D.; Wasson, O.A.; Schrack, R.A.; Behrens, J.W. (National Bureau of Standards, Washington, DC (USA)). Jun 1980. 16p. Pub. in Proceedings of IAEA Consultants' Meeting on Neutron Source Properties, Kossuth Lajon University, Debrecen, Hungary, March 17-21, 1980, p119-134 1980.

Methods are described for accurately characterizing the neutron beam from a white source in spectral shape, absolute intensity, and source brightness distribution. Measurements can be made over more than nine decades of energy from .01 to 2 x 10 to the 7th power eV from a single source. Beams with easily modified spectrum and with total intensity (integrated over energy) of 1,000,000 n/sq cm-sec can be obtained. Over most of the energy range these methods can be implemented with a modest electron linac facility operating in the 10 - 12 MeV range. Such a versatile facility is perhaps within the budgetary range of even a modest laboratory.

22522 **Electron thermalization in gases. V. Diatomic molecules H_2, N_2, and CO.** Tembe, B.L.; Mozumder, A. (Radiation Laboratory and the Department of Chemistry, University of Notre Dame, Notre Dame, Indiana 46556). *Journal of Chemical Physics;* **78**: No. 4, 2030-2038(15 Feb 1983).

The method introduced by one of us (AM) for calculating the thermalization times, evolution of the effective electron temperature, and other quantities of interest in electron thermalization, is extended to the diatomic molecules H_2, N_2, and CO. Starting with a displaced pseudo-Maxwellian distribution function for energetic electrons, the evolution of the thermalization process is studied using available cross section data for elastic and inelastic processes. Careful attention has been paid to microscopic reversibility and detailed balancing. We find that, while the major contributions to thermalization are due to rotational and vibrational excitations of the gas molecules, the contribution due to elastic collisions is not negligible. We also find that the relaxation time (obtained from the relaxation time due to inelastic and elastic processes) is a significant part of the thermalization time. The relative contributions of elastic and inelastic processes are evaluated as a function of time as well as gas temperature. Calculated results are in reasonable agreement with experimental data.

22523 **Density effect for the ionization loss of charged particles in various substances.** Sternheimer, R.M.; Seltzer, S.M.; Berger, M.J. (Department of Physics, Brookhaven National Laboratory, Upton, New York 11973). *Physical Review [Section] B: Condensed Matter;* **26**: No. 11, 6067-6076(1 Dec 1982).

The density-effect correction $\delta(\beta)$ for the ionization energy loss of charged particles has been evaluated for 72 substances (34 metallic elements, 26 compounds, 11 gases, and liquid hydrogen), using up-to-date values of the mean excitation potential I and of the atomic absorption edges hν/sub i/, which were employed as input data for the general equations for $\delta(\beta)$ previously derived by Sternheimer.

22524 **Calorimetric measurement of electron stopping power of aluminum and copper between 11 and 127 keV.** Hubbell, H.H. Jr.; Birkhoff, R.D. (Health and Safety Research Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Physical Review [Section] A: General Physics;* **26**: No. 5, 2460-2467(Nov 1982).

The stopping powers of aluminum and copper have been measured for electrons between 11 and 127 keV. Evaporated foils of about 200-nm thickness were stretched across rings and inserted into a short cylinder which was supported by thermocouple wires. Peltier heating and cooling by one thermopile were used to control foil temperature, while another thermopile measured its temperature. Calibration was accomplished by reducing beam energy until complete absorption was obtained. Delta rays produced in the foil were returned to it by repelling electrodes. Corrections were made for increased path length in the foil due to multiple elastic small-angle scattering and for spurious heating by scattered electrons striking the ring holding the foil. After correction for these effects, good agreement with the Bethe-Bloch formula was found.

22525 **Physical measurements with high-energy radioactive beams.** Chatterjee, A.; Saunders, W.; Alpen, E.L.; Alonso, J.; Scherer, J.; Llacer, J. (Lawrence Berkeley Lab., CA). *Radiation Research;* **92**: No. 2, 230-244(Nov 1982). Contract W-7405-ENG-48.

Physical measurements were made with high-energy radioactive beams (positron emitters) produced as secondary particles from a heavy-particle accelerator. Data are presented for water-equivalent thickness of a silicon diode, a comparison of Bragg peak ionization depth vs stopping depth, and differential stopping depths when a beam is intercepted by heterogeneous materials in the orthogonal direction. A special positron-emitting beam analyzing (PEBA) system was used in form images of the stopped radioactive beam. These measurements will have direct impact on charged-particle radiotherapy, since the precise range of beams of charged particles to targets within patients can be measured and used for treatment planning. Also, during the treatments the stopping point of the beam can be monitored to verify that the treatment is being delivered as planned.

22526 **Subshell stopping power of the elements for protons in the Born approximation.** McGuire, E.J. (Sandia National Laboratories, Albuquerque, New Mexico 87185). *Physical Review [Section] A: General Physics;* **26**: No. 4, 1858-1870(Oct 1982).

The generalized oscillator-strength formulation of the Born approximation was used to generate a large sample of subshell excitation and ionization generalized oscillator strengths across the periodic table. These were used to calculate the excitation and ionization contributions to the proton stopping power by individual subshells. The subshell ionization stopping powers are expressed in scaled form, depending on the subshell ionization energy. Detailed comparison of the calculated total proton stopping power is in good agreement with experiment across the periodic table. Detailed calculations show the importance of outer-shell ionization and excitation to the total stopping power for protons with energy less than 10 MeV.

22527 **Stopping power of some lightly ionized gold ions for protons.** McGuire, E.J. (Sandia National Laboratories, Albuquerque, New Mexico 87185). *Physical Review [Section] A: General Physics;* **26**: No. 4, 1871-1882(Oct 1982).

Calculations are presented for the stopping power of Au/sup n/+ (0< or =n< or =11) for protons with energy between 0.1 and 10 MeV. Over this range the proton stopping power changes by at least a factor of 2 between neutral and 11 times ionized gold. Explicit Born-approximation calculations are done for both excitation (for all ions considered) and ionization (for selected ions). For inner shells (nl< or =4d) the explicit calculations are in excellent agreement with results obtained from scaling laws. For outer shells (nl> or =4f) there are differences of as much as a factor of 2 between the explicit calculations and the scaling laws for some subshells of some ions. A correction to the scaling laws using an integral over optical oscillator strength is developed which removes some of the disagreement between the explicit calculations and scaled values. The residual difference between the explicit calculations and the scaled values appears to arise from the spatial expansion of an ion subshell orbital compared to an atom subshell orbital even when the subshells have the same ionization energy.

22528 **Gamma-ray dose at shield-tissue interfaces and buildup factor implications.** Trubey, D.K.; Gopinath, D.V.; Subbaiah, K.V. (Oak Ridge National Laboratory, Oak Ridge, TN 37830). *Transactions of the American Nuclear Society;* **41**: 494-495(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

22529 **Sensitivity study of neutron transport through standard and rebar concrete.** Bhuiyan, S.I.; Lucius, J.L.; Roussin, R.W. (Oak Ridge National Laboratory, Oak Ridge, TN 37830). *Transactions of the American Nuclear Society;* **41**: 493(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

22530 **Monte Carlo particle transport to GeV energies.** Prael, R.E. (Los Alamos National Laboratory, P.O. Box 1663, Los Alamos, NM 87545). *Transactions of the American Nuclear Society;* **41**: 480-481(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

22531 **Finite-difference approximations and superconvergence for the discrete-ordinate equations in slab geometry.** Larsen, E.W. (Los Alamos Scientific Lab., NM); Nelson, P. *SIAM (Society for Industrial and Applied Mathematics) Journal on Numerical Analysis;* **19**: No. 2, 334-348(Apr 1982).

A unified framework is developed for calculating the order of the error for a class of finite-difference approximations to the monoenergetic linear transport equation in slab geometry. In particular, the global discretization errors for the step characteristic, diamond, and linear discontinuous methods are shown to be of order two, while those for the linear moments and linear characteristic methods are of order three, and that for the quadratic method is of order four. A superconvergence result is obtained for the three linear methods, in the sense that the cell-averaged flux approximations are shown to converge at one order higher than the global errors.

22532 **Flux limiters and Eddington factors.** Pomraning, G.C. (Lawrence Livermore National Lab., CA). *Journal of Quantitative Spectroscopy and Radiative Transfer;* **27**: No. 5, 517-530(1982). Contract W-7405-ENG-48.

In this paper a closure scheme for the first two angular moments of the time-dependent equation of transfer is presented, either via an Eddington factor which leads to a telegrapher's description, or via a Fick's law which leads to a diffusion description. Points discussed include boundary conditions (both an extension of the classic Marshak-Milne condition and those arising from a boundary layer analysis), the flux limiting feature of the diffusion approximation, and the reduction of the theory to asymptotic diffusion theory in the steady state limit.

22533 **Directions in the theory of resonance-radiation pressure.** Cook, R.J. (California Univ., Livermore (USA). Lawrence Livermore Lab.). *Comments on Atomic and Molecular Physics;* **10**: No. 6, 267-277(May 1981).

A number of recent developments in the theory of atomic motion in resonant radiation are explained and discussed. Specific topics covered include: (i) the spontaneous radiation force; (ii) the anomalous radiation force on an inverted atomic transition; (iii) trapping of atoms by the dipole force; (iv) cooling by the dissipative force in a below-resonance standing wave; and (v) the optical Stern-Gerlach effect. In addition, it is shown how quantum fluctuations of the resonance-radiation force limit the temperature achievable by radiation cooling and limit the confinement time for an atom in a radiation trap.

22534 Low-temperature measurements of the fraction of re-emitted positronium from a Cu(111)+S surface. Lynn, K.G.; Schultz, P.J.; MacKenzie, I.K. (Brookhaven National Lab., Upton, NY). *Solid State Communications;* **38**: No. 6, 473-476(1981).

A positron beam has been utilized to measure the positronium (Ps) fraction re-emitted from a Cu(111)+S sample from 40°K to 350°K for incident energies ranging from 0.5 to 5 keV. The results at 525 eV incident energy are compared with two recent theories from 40°K to 850°K. The Ps fraction shows only a slight positive temperature dependence below room temperature and it is concluded that the positron trapping rate and probability of Ps formation at the surface are largely independent of sample temperature for Cu(III)+S. In addition evidence is presented that positrons in the bulk material are not localized in shallow traps at low temperatures for well-annealed high-purity single crystals of Cu and Al.

22535 Use of mean absorption coefficients in the presence of strong temperature gradients. Pomraning, G.C. (Lawrence Livermore National Lab., CA); Prinja, A.K.; Shokair, I.R. *Journal of Quantitative Spectroscopy and Radiative Transfer;* **26**: No. 3, 199-213(1981).

Results obtained by using the Planck and Rosseland mean absorption coefficients are compared with exact multifrequency transport results in a purely absorbing halfspace problem in the presence of strong temperature gradients. Numerical results are given for both a prescribed temperature distribution in the presence of an Elsasser band absorption coefficient and a self-consistent radiative equilibrium distribution corresponding to a source deep within the halfspace transporting through a picket fence absorption coefficient. This latter problem (the Milne problem) is analyzed using the Wiener-Hopf factorization technique, and an explicit expression is given for the characteristic H-function. It is concluded that the use of the Rosseland mean in generally more accurate than the use of the Planck mean, but that the Rosseland mean results can nevertheless be significantly in error.

22536 Lorentz gas. Alder, B.J.; Alley, W.E. (Lawrence Livermore Lab., CA). pp 5-21 of Perspectives in statistical physics. Raveche, H.J. (ed.). Amsterdam, Netherlands; North-Holland Publishing Company (1981).

The Lorentz gas is discussed for two reasons. First, it is believed that unless the behavior of the Lorentz gas is understood in detail, the theory of transport properties is in bad shape. This is because the Lorentz gas is the simplest conceivable model of transport, yet it appears to obey not even in the low density limit, molecular chaos approximation, thought so generally applicable. The second reason is because of the contribution to the theory of transport properties by Mel Green, namely the fluctuation-dissipation approach. That approach gives general expressions for transport coefficients valid at all times and densities in terms of correlation or autocorrelation functions calculated from a system at equilibrium. It is the combination of computer simulation and the autocorrelation formulation that has proven so fruitful in advancing understanding of transport theory. A discussion is given of the autocorrelation function calculated by computer for the Lorentz gas at low density and intermediate densities. A discussion of the theory is also presented. (SC)

22537 Report on the seventh international conference on transport theory. Greenberg, W.; Williams, M.; Zweifel, P.F. (Virginia Polytechnic Inst. and State Univ., Blacksburg). *Transport Theory and Statistical Physics;* **10**: No. 3, 115-130(1981).

A brief summary is given of each of the 29 papers given at the 7th international conference on transport theory. (SC)

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REFER ALSO TO CITATION(S) 21513, 21808, 21970, 21982

22538 (ANL/NESC—413) ALPHA-M; resolution of gamma-ray spectra. Schonfeld, E. (Oak Ridge National Lab., TN (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048413.

ALPHA-M is used for determining radioisotopes by least-squares resolution of the gamma ray spectra. It can handle a very large library of gamma ray spectra and takes into account corrections such as background subtraction, counting time, decay time, dead time, automatic compensation for gain and threshold shifts, size of the aliquot, volume reduction prior to counting, and so on.IBM360; FORTRAN IV.

22539 (ANL/NESC—418) CHAINS; analysis of radioactive decay chains. Henderson, W.B. (Westinghouse Electric Corp., Pittsburgh, PA (USA). PWR Systems Div.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048418.

Maxima of - 50 members in a chain 100 energy groups 100 time values.

CHAINS computes the atom density of members of a single radioactive decay chain. The linearity of the Bateman equations allows tracing of interconnecting chains by manually accumulating results from separate calculations of single chains. Re-entrant loops can be treated as extensions of a single chain. Losses from the chain are also tallied.GE625,635; FORTRAN IV; GECOS; 16K memory.

22540 (NUREG/CR—2891) Performance testing of personnel-dosimetry services. Final report of test No. 3. Plato, P.; Miklos, J. (Michigan Univ., Ann Arbor (USA). School of Public Health). Feb 1983. 174p. NTIS, PC A08/MF A01 - GPO $6.50. Order Number DE83901542.

In September, 1977, the University of Michigan began a pilot study of the Health Physics Society Standards Committee (HPSSC) Standard titled, Criteria for Testing Personnel Dosimetry Performance. Approximately 70 dosimetry processors volunteered to participate in one or more of three tests of the HPSSC Standard. The results from Tests No. 1 and No. 2 were used to evaluate and revise the Standard which was then adopted by the HPSSC in June, 1981. The Standard was also adopted by the American National Standards Institute as ANSI N13.11-1982 in June, 1982. Test No. 3 of the revised HPSSC Standard was conducted from November, 1981 to April, 1982. The objectives of Test No. 3 were to determine if the Standard is acceptable for future testing programs, and to provide experience with the final version of the Standard. The passing rate among all the processors for Test No. 3 was 75% compared to passing rates of 48% and 62% for Tests No. 1 and No. 2, respectively, with adjustments made for changes in the Standard following Test o. 2. Among all the individual dosimeters irradiated during Test No. 3, 89% had a reported dose within +-50% of the delivered dose compared to 79% and 86% of the dosimeters irradiated for Test No. 1 and No. 2. The HPSSC Standard was found to be an acceptable measure of minimum performance and an appropriate basis for a regulatory program to accredit dosimetry processors.

22541 (NUREG/CR—2892) Performance testing of personnel dosimetry services. A revised procedures manual. Miklos, J.; Plato, P. (Michigan Univ., Ann Arbor (USA). School of Public Health). Feb 1983. 217p. NTIS, PC A10/MF A01 - GPO $7.50. Order Number DE83901539.

The US Nuclear Regulatory Commission's pilot study of the Health Physics Society Standards Committee Standard, Criteria for Testing Personnel Dosimetry Performance, was begun in 1977. A third test of this Standard was conducted from November, 1981 through April, 1982. The objective of this Procedures Manual is to describe the procedures used for Test No. 3 which reflect the changes in the Standard from Tests No. 1 and No. 2. This Manual describes each of the radiation sources used for Test No. 3, as well as the administrative procedures used during the test program. Methods of irradiation, quality control, data analysis, record keeping, and handling large numbers of dosimeters are presented. This Manual discusses the role of the National Bureau of Standards in verifying the validity of the calibration of each radiation source. Suggestions for improving irradiation procedures are included as well as recommendations that will facilitate the operation of the permanent testing facility.

22542 **(PB—83-139246) Report on standardization of radiation dosimetry.** Mann, W.B. (National Bureau of Standards, Washington, DC (USA)). 1978. 8p. Pub. in Proceedings of IAEA Symposium, National and International Standardization of Radiation Dosimetry, Atlanta, GA., Dec 77, II, p147-154 1978.

From nuclear data tables, such as those compiled by the Oak Ridge Nuclear Data Project, the absorbed dose to a homogenous medium can be calculated from given values of the mean energy per radiation, expressed in gram rad per microcurie hour. To make any of these calculations the activities of the various components of radioactive effluents or of the administered radiopharmaceuticals must be known. For more than ten years the Radioactivity Section of the National Bureau of Standards has been devoting a very considerable part of its effort to the production of radioactivity standards that are needed in environmental and nuclear-medicine measurements. Such standards are also being produced in appropriate environmental matrices and the latest available nuclear-decay data, often produced in the Radioactivity Section, is also supplied. Traceability to the International and National Radioactivity Measurements Systems is discussed.

22543 **(PNL-SA—10714) Ninth DOE workshop on personnel neutron dosimetry.** (Pacific Northwest Lab., Richland, WA (USA)). Dec 1982. Contract AC06-76RL01830. 231p. (CONF-820668—). NTIS, PC A11/MF A01. Order Number DE83006605.

From 9. DOE workshop on personnel neutron dosimetry; Las Vegas, NV, USA (24 Jun 1982).

Separate abstracts wre prepared for 18 of the 19 papers presented at a workshop on personnel neutron dosimetry. The other paper is a duplicate of a paper already in the data base. (KRM)

22544 (PNL-SA—10714, pp 120-137) **Neutron and gamma radiation transport problems solved using TARNP and MORSE codes.** Prevo, C. (Lawrence Livermore National Lab., CA). Dec 1982. NTIS, PC A11/MF A01.

From 9. DOE workshop on personnel neutron dosimetry; Las Vegas, NV, USA (24 Jun 1982).

It is important for any research and development program that calculational tools be available to complement experimental efforts. In neutron dosimetry, calculations enable one to predict the response of a proposed dosimeter before effort is expended to design and fabricate the neutron intrument or dosimeter. Also, since the neutron spectrum is so important in determining how a particular dosimeter will response, having the ability to calculate the neutron spectrum for a wide variety of source, moderator, and shield configurations is extremely valuable. The nature of these calculations requires the use of computer programs that implement mathematical models representing the transport of radiation through attenuating media. Numerical and in some cases analytical, solutions of these models can be obtained by one of several calculational techniques. Calculational methods include spherical harmonics, discrete ordinates, moments, Monte Carlo, diffusion theory, invariant imbedding, and kernels, plus invariant bedding method, all of these techniques are either approximate solutions to the well-known Boltzmann equation or are based on kernels obtained from solutions to the equation. This paper focuses on the Monte Carlo technique.

22545 **Investigation of buildup dose from electron contamination of clinical photon beams.** Petti, P.L.; Goodman, M.S.; Gabriel, T.A.; Mohan, R. (Department of Physics and Cyclotron Laboratory, Harvard University, Cambridge, Massachusetts 02138). *Medical Physics;* **10**: No. 1, 18-24(Jan 1983).

The contribution made by contaminating electrons present in a clinical photon beam to the buildup dose in a polystyrene phantom has been calculated and compared to measurements. A Monte Carlo technique was employed. The calculation was divided into two parts. First, the accelerator treatment head was simulated in detail using the EGS—PEGS electromagnetic shower code. Then, information obtained from these calculations was used to compute dose curves in a polystyrene phantom. Two cases were considered, one in which both electrons and photons were incident upon the phantom, and another in which electrons were eliminated from the incident beam. Results of these calculations agree with recent experimental findings. A decrease in buildup dose as well as a shift in d/sub max/ was observed when electrons were eliminated from the beam.

6560 Solid State Physics

REFER ALSO TO CITATION(S) 21090, 21100, 21160, 21161, 21162, 21166, 21441, 22189, 22195, 22235, 22518, 22566

22546 **(ANL/NESC—360) TOR; thermal scattering for crystalline materials.** Clendenin, W.W. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048360.

The phonon frequency distribution is specified by 4 to 201 points.

The TOR program calculates the scattering law for a crystalline material in the incoherent approximation, from the phonon frequency distribution and a specified temperature. A proportional quantity is punched in the form of a table for interpolation of the double differential cross section. As an alternative, the program obtains the analogous quantities for a monatomic gas.CDC6600; FORTRAN IV; SCOPE; 32K memory.

22547 **(ANL/NESC—938) ORTEP2; crystal structure illustration plots.** Johnson, C.K. (Oak Ridge National Lab., TN (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048938.

Maxima of - 599 stored bonds 166 atoms in the input list.

ORTEP2 draws crystal structure illustrations using a CalComp plotter. Ball-and-stick type illustrations of publication quality are produced with either spheres or thermal-motion probability ellipsoids on the atomic sites. The program can produce stereoscopic pairs of illustrations which aid in the visualization of complex packing arrangements of atoms and thermal motion patterns. Interatomic distances, bond angles, and principal axes of thermal motion are calculated also as part of the structural study. ORTEP2 includes a hidden-line algorithm to eliminate those portions of atoms or bonds behind other atoms or bonds.IBM360,370,303x; FORTRAN IV (90%) and Assembly language (10%); OS/360; 284K bytes of memory and plotting devices.

22548 **(CONF-811150—11) Theory of Moessbauer line broadening due to diffusion.** Schroeder, K.; Wolf, D.; Dederichs, P.H. (Argonne National Lab., IL (USA)). Dec 1981. Contract W-31-109-ENG-38. 5p. NTIS, PC A02/MF A01. Order Number DE83007759.

From Yamada conference on point defects and defect interactions in metals; Kyoto, Japan (16 Nov 1981).

We have calculated the line broadening of the Moessbauer line due to diffusion of Moessbauer atoms via single vacanices. We take into account the perturbation of vacancy jumps in the neighbourhood of an impurity Moessbauer atom (e.g. Fe in Al) using the 5-frequency model. The anisotropy of the line width is given by the Fourier transform of the final distribution of a Moessbauer atom after an encounter with a vacancy. This distribution is calculated by Monte Carlo computer simulation. 3 figures, 1 tables.

22549 **Rietveld refinement with spallation neutron powder diffraction data.** von Dreele, R.B. (Arizona State Univ., Tempe (USA). Dept. of Chemistry); Jorgensen, J.D. (Argonne National Lab., IL (USA)); Windsor, C.G. (UKAEA Atomic Energy Research Establishment, Harwell). *Journal of Applied Crystallography;* **15**: No. 6, 581-589(1 Dec 1982).

The mathematical functions necessary for Rietveld refinement of time-of-flight neutron powder diffraction patterns from spallation sources are developed and a computer program for least-squares analysis is described. The results of Rietveld refinements of nickel and a low-carbon steel are described and discussed. The method fully exploits the high resolution (Δd/d approximately 0.3 approximately 0.5%) available with powder diffractometers currently in operation on these sources and examples are given of precise determination of atom coordinates, thermal parameters, lattice parameters and the detection of small strains.

22550 **Energy and entropy of interacting dislocations.** Ladd, A.J.C.; Hoover, W.G. (Department of Applied Science, University of California at Davis, Davis, California 95616). *Physical Review* [*Section*] *B: Condensed Matter;* **26**: No. 10, 5469-5479(15 Nov 1982). Contract W-7405-ENG-48.

The energy and entropy of interacting edge dislocations have been calculated by atomistic simulations, with the use of piecewise-linear forces in a two-dimensional triangular lattice. We conclude that the interaction energy between small groups of dislocations is well described by continuum mechanics for separations greater than a few lattice spacings. Our calculations enable us to make a precise determination of the core energy, which is an essential parameter in determining dislocation multiplication rates. We find also that continuum mechanics gives an accurate representation of the interaction of a dislocation pair with a homogeneous elastic stress field. The vibrational contribution to the entropy of such a pair is small, about 0.3k.

22551 **Small and large wave vector behavior for the structure factor of an interacting nonuniform electron gas.** Geldart, D.J.W. (Universite de Paris Sud, Orsay, France); Rasolt, M. *Physics Letters* [*Section*] *A;* **88**: No. 3, 121-124(1 Mar 1982). Contract W-7405-ENG-26.

It is shown that the structure factor of an interacting nonuniform electron gas does not go to zero at small q, as one might conclude from the conservation of particles sum rule, and is not giving rigorously in the local density approximation at large q.

22552 **Finite element part of the Lamcal program.** Lamain, L.G.; Blanckenburg, J.F.G. Luxembourg; Commission of the European Communities (1982). 58p. (EUR—7999-EN). Commission of the European Communities, Luxembourg.

The code is based on the displacement method using the small strain incremental plasticity theory. The non-linear basic equations are expressed in the tangent modulus formulation and solved by an iterative procedure. Iterations are applied until a specified tolerance on the equilibrium is reached. To avoid that a stress state moves outside the yield surface, a substepping in the stresses is performed every iteration. To judge the solution process, the change in stress-state of an integration point is given every iteration (from the elastic to plastic or from plastic to elastic state). Also the norm of the residual stresses is given every iteration to be able to check the convergence rate.

22553 **Self-consistent approximations beyond the CPA. Part II.** Kaplan, T. (Oak Ridge National Lab., TN); Gray, L.J. pp 129-143 of Excitations in disordered systems. Thorpe, M.F. (ed.). New York, NY; Plenum Publishing Corp. (1982). Contract W-7405-ENG-26.

A short description of the Augmented Space Formalism is given. Next, the self-consistent approximation is developed and several model calculations are provided. Then the extension of the self-consistent approximation to alloys with short-range order is examined. (SC)

22554 **The metallization of some simple systems.** Ross, M.; McMahan, A.K. (Lawrence Livermore National Lab., CA). pp 161-168 of Physics of solids under high pressure. Schilling, J.S.; Shelton, R.N. (eds.). Amsterdam, Netherlands; North-Holland Publishing Company (1981). Contract W-7405-ENG-48.

This paper discusses the metallization of Xe, Ar, He, I_2, H_2, and N_2 in terms of some recent theoretical work and shock-wave experiments. New shock-wave data on liquid hydrogen and deuterium leads to a predicted pressure above 3 Mbar for the appearance of a monatomic metal phase. CsI is expected to become metallic near 0.8 Mbar.

22555 **Validity of the Onsager reciprocal relations.** Mullins, W.W.; Sekerka, R.F. (Carnegie-Mellon Univ., Pittsburgh, PA). *Scripta Metallurgica;* **15**: No. 1, 29-33(1981). Contract AC02-76ER02407.

This article examines the conditions under which the Onsager reciprocal relations hold for the matrix of transport coefficients in the constitutive laws for heat and mass transport in continuous systems. For a K component system and a suitable choice of reference frame, those laws may be expressed in the form vector J/sub i/ = summation from j = 0 to K [H/sub ij/vector F/sub j/] summation from j = 0 to K [H/sub ij/grad h/sub i/ where vector J_0 is the energy flux, vector J/sub i/ for i = 1,. . .,K is the mass flux of the i/sup th/ species, and the vector F/sub j/ = grad h/sub j/ are thermodynamic driving forces in which the h/sub j/ are potentials that are functions of the local thermodynamic state; and H/sub ij/, also functions of the local state, are the transport coefficients whose symmetry is under consideration. All terms in Equation 1 will depend in general on position.

22556 **Coherent medium approach to hopping conduction.** Lax, M.; Odagaki, T. (City Coll., New York). *Lecture Notes in Physics;* No. 154, 148-176(1981).

The coherent medium approach to hopping conduction problems where the motion of carriers obey the usual random walk equation is presented. The coherent medium approximation (CMA) is introduced to obtain an approximate but easily tractable coherent medium. The CMA is applied to various cases of hopping conduction in one- and three-dimensions and the results are compared with experiment. A simple comparison of CMA with other methods is also given. (SC)

6561 Superconductivity

REFER ALSO TO CITATION(S) 21120, 21128, 21131, 21174

22557 **(N—8229374) Critical fields of liquid superconducting metallic hydrogen.** Jaffe, J.; Ashcroft, N.W. (Cornell Univ., Ithaca, NY (USA)). Jul 1982. 14p. (NASA-CR—169160; MSC—4775). NTIS, PC A02/MF A01.

Liquid metallic hydrogen, in a fully dissociated state, is predicted at certain densities to pass from dirty to clean and from type II to type I superconducting behavior as temperature is lowered.

22558 **(SAND—82-1907C) Bechgaard salts: magnetotransport, dimensionality, spin-density waves, and the threshold field.** Kwak, J.F. (Sandia National Labs., Albuquerque, NM (USA)). 1982. Contract AC04-76DP00789. 9p. (CONF-821226—1). NTIS, PC A02/MF A01. Order Number DE83006398.

From Low dimensional contractors conference; St. Maurice, France (10 Dec 1982).

A review of the metallic-state magnetotransport properties of the superconducting Bechgaard compounds (organic compounds based on 2:1 salts of tetramethyltetraselenafulvalenium) is presented, with emphasis on the unique threshold field associated with the Shubnikov-de Haas effect. Orbit area calculations based on the currently accepted band anisotropy imply nesting of the Fermi surface by an instability at a commensurate wavevector other than the optimal value (2k/sub F/, π/b), leading to a model of wavevector commensuration shift at the threshold. The evidence for spin-Peierls ordering as the relevant instability is discussed. Finally, a comment is made regarding the applicability to these materials of any model involving large one-dimensional fluctuations.

6570 Theoretical Physics

REFER ALSO TO CITATION(S) 21237, 21238, 21239, 22408, 22592, 22764

22559 **(ANL/NESC—390) CORGAM; unfolding of complex gamma-ray spectra.** Eckhoff, N.D. (Kansas State Univ., Manhattan (USA). Dept. of Nuclear Engineering). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048390.

Currently the program is restricted to a problem of 400 channels and 15 reference spectra. There would be no difficulty in expanding this to as many as 4096 channels. However, the number of reference spectra is limited by the accuracy desired in the inversion procedure. The inversion program currently being used would suffer (from the accuracy standpoint) if the number of reference spectra were greater than 25.

A correlation algorithm is coded to allow the unfolding of complex gamma-ray spectra typically collected in a neutron activation analysis procedure. CORGAM (1) will compensate for electronic shifts in the data, (2) will correct for background, (3) will normalize the data to a fixed neutron flux level, (4) allows a choice of weighting factors, and (5) allows a choice of methods for calculation of standard deviations. The code requires a matrix of reference gamma-ray spectra. These spectra can be in raw-data form. All of the modifications available to the complex gamma-ray spectra are available to the reference gamma-ray spectra. In addition, a decay correction is available for the reference gamma-ray spectra. Only the reference gamma-ray spectra that have intensity coefficients which are significant at a prescribed level of significance are retained in the final solution. The intermediate solutions, i.e., those solutions that contain reference gamma-ray spectra which have nonsignificant intensity coefficients at the prescribed level, are printed out. Therefore, several solutions are imbedded in the final solution.IBM360/50; FORTRAN IV Level G; OS/360.

22560 **(ANL/NESC—417) ATHENA4; inelastic scattering form factors.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Satchler, G.R. (Oak Ridge National Lab., TN (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048417.

Maxima of - 100 wave function components 10 interaction components The reduced matrix elements of the one-body multipole operators may be included automatically in the wave function coefficients. Non-local effects on the wave functions may be included in the local energy approximation.

ATHENA4 computes form factors for inelastic scattering calculations, using single-particle wave functions that are eigenstates of motion in either a Woods-Saxon potential well or a harmonic oscillator well. Two-body forces of Gauss, Coulomb, Yukawa, and a sum of cut-off Yukawa radial dependences are available.IBM360/75,91; FORTRAN IV; OS/360.

22561 **(DOE/ER/10651—T1-Vol.2) Lie-admissible approach to the hadronic structure. Volume II. Covering of the Galilei and Einstein relativities. Hadronic press monographs in theoretical physics Number 2.** Santilli, R.M. (Institute for Basic Research, Cambridge, MA (USA). Div. of Physics). Jul 1982. Contract AC02-80ER10651. 331p. NTIS, PC A15/MF A01. Order Number DE83007251.

Topics covered include: Lie-admissible algebras; Birkhoff-admissible covering of Hamilton's and of Birkhoff's equations; Lie-admissible covering of Lie's theory; symplectic-admissible covering of symplectic geometry; and generalization of Galilei and Einstein special relativity for closed systems with non-Hamiltonian internal forces. (GHT)

22562 **(LA-UR—83-333) Heuristic introduction to gravitational waves.** Sandberg, V.D. (Los Alamos National Lab., NM (USA)). 1982. Contract W-7405-ENG-36. 7p. (CONF-820989—5). NTIS, PC A02/MF A01. Order Number DE83007546.

From Workshop on science underground; Los Alamos, NM, USA (27 Sep 1982).

The purpose of this article is to provide a rough and somewhat heuristic theoretical background and introduction to gravitational radiation, its generation, and its detection based on Einstein's general theory of relativity.

22563 **(LA-UR—83-512) Multiple-scattering corrections to the Beer-Lambert law.** Zardecki, A. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 9p. (CONF-830420—1). NTIS, PC A02/MF A01. Order Number DE83007564.

From Society of Photo-Optical Instrumentation Engineers conference; Arlington, VA, USA (4 Apr 1983).

The effect of multiple scattering on the validity of the Beer-Lambert law is discussed for a wide range of particle-size parameters and optical depths. To predict the amount of received radiant power, appropriate correction terms are introduced. For particles larger than or comparable to the wavelength of radiation, the small-angle approximation is adequate; whereas for small densely packed particles, the diffusion theory is advantageously employed. These two approaches are used in the context of the problem of laser-beam propagation in a dense aerosol medium. In addition, preliminary results obtained by using a two-dimensional finite-element discrete-ordinates transport code are described. Multiple-scattering effects for laser propagation in fog, cloud, rain, and aerosol cloud are modeled.

22564 **(UCID—18574-82-3) H-Division quarterly report, July-September 1982.** (Lawrence Livermore National Lab., CA (USA)). 31 Jan 1983. Contract W-7405-ENG-48. 55p. NTIS, PC A04/MF A01. Order Number DE83006274.

Topics covered include: theoretical studies on Hugoniots of polybutene and benzene; pseudopotential equation of state for solid and liquid sodium; Thomas-Fermi bag model for equation of state estimates; classical theory of ionization in plasmas; plasma screening effects on inelastic electron-ion collisions; the calculation of spectral line series emission including line broadening, line merging and ionization potential depression; blast attenuation in a shot tunnel using water jets; and specific heat data for liquid copper. (GHT)

22565 **(UCRL—88642) Review of quantum Monte Carlo methods and results for Coulombic systems.** Ceperley, D. (Lawrence Livermore National Lab., CA (USA)). 27 Jan 1983. Contract W-7405-ENG-48. 12p. (CONF-821166—1). NTIS, PC A02/MF A01. Order Number DE83006570.

From Monte Carlo methods in quantum problems conference; Paris, France (29 Nov 1982).

The various Monte Carlo methods for calculating ground state energies are briefly reviewed. Then a summary of the charged systems that have been studied with Monte Carlo is given. These include the electron gas, small molecules, a metal slab and many-body hydrogen.

22566 **Many-body theory in condensed matter physics.** de Llano, M. (Ames Laboratory USDOE and Department of Physics, Iowa State University, Ames, Iowa 50011 and Instituto de Fisica & Facultad de Ciencias, Universidad Nacional de Mexico, 01000 Mexico, DF, Mexico). *American Journal of Physics;* **51**: No. 3, 247-256(Mar 1983). Contract W-7405-ENG-82.

The nonrelativistic, continuous (as opposed to "spin") many-body problem as it relates to condensed matter at absolute zero temperature is reviewed in simple, nontechnical terms, mainly from the standpoint of infinite-order perturbation theory, for physical systems where all the particles have the same mass but which otherwise interact with arbitrary short- or long-range two-body forces.

22567 Random walks on the Bethe lattice. Hughes, B.D.; Sahimi, M. (Department of Chemical Engineering and Materials Science, University of Minnesota, Minneapolis, Minnesota 55455). *Journal of Statistical Physics;* **29**: No. 4, 781-812(Dec 1982).

We obtain random walk statistics for a nearest-neighbor (Polya) walk on a Bethe latttice (infinite Cayley tree) of coordination number z, and show how a random walk problem for a particular inhomogeneous Bethe lattice may be solved exactly. We question the common assertion that the Bethe lattice is an infinite-dimensional system.

22568 Staticial mechanics of red blood cells aggregation: The distribution of Rouleaux in thermal equilibrium. Wiegel, F.W.; Perelson, A.S. (Department of Applied Physics, Twente University of Technology, P. O. Box 217, Enschede, The Netherlands). *Journal of Statistical Physics;* **29**: No. 4, 813-878(Dec 1982).

When placed in suspension red blood cells adhere face-to-face and form long, cylindrical, and sometimes branched structures called rouleaux. We use methods developed in statistical mechanics to compute various statistical properties describing the size and shape of rouleaux in thermodynamic equilibrium. This leads to analytical expressions for (1) the average number of rouleaux consisting of n cells and having m branch points: (2) the average number of cells per rouleau; (3) the average number of branch points per rouleau; and (4) the number of rouleaux with n cells in a system containing a total of N cells. We also derive asymptotic formulas that simplify these analytic expressions, and present numerical comparisons of the exact and asymptotic results.

22569 Optimization of planar metallic nonrefracting transmission-grating profiles for mth-order intensity maximization in the soft-x-ray range. Tatchyn, R.; Csonka, P.L.; Lindau, I. (Standord Synchrotron Radiation Laboratory and Stanford Electronics Laboratorties, Stanford University, Stanford, California 94305). *Journal of the Optical Society of America;* **72**: No. 12, 1630-1638(Dec 1982).

We derive the thickness profiles of metallic transmission-grating bars that maximize either the power throughput into the mth diffracted order or the ratio of the mth-order diffracted power to the total output (in the soft-x-ray range). The derivation is performed for both general and symmetric bar shapes and for the two physically important cases of continuous gratings and gratings with integral bars. The analysis is valid for all cases in which the optical constants are general functions of position in a direction perpendicular both to the light and to the grating bars. Examples of some optimum profiles for gold in the soft-x-ray range are computed on the basis of the presented analysis and are tabulated for convenient reference.

22570 High-temperature free-energy expansion for metal fluids. Wallace, D.C.; Holian, B.L.; Johnson, J.D.; Straub, G.K. (Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Physical Review [Section] A: General Physics;* **26**: No. 5, 2882-2885(Nov 1982).

The cluster expansion of the Helmholtz free energy is based on two-body interactions through a central potential phi(r). For a fluid at fixed density, it is shown that the cluster expansion provides a convergent high-temperature expansion of the free energy. Because phi(r) for a liquid metal depends explicitly on the density, the corresponding cluster expansion of the pressure differs from the ordinary virial series. For a physically realistic interaction, phi(r) is integrable at small r. From this it follows that the two-body-interaction contributions to thermodynamic functions for realistic fluids are bounded at high temperatures. In contrast, for potentials such as Lennard-Jones which are not integrable at small r, these thermodynamic contributions increase without limit as the temperature increases.

22571 Observation of a Pomeau-Manneville intermittent route to chaos in a nonlinear oscillator. Jeffries, C.; Perez, J. (Materials and Molecular Research Division, Lawrence Berkeley Laboratory, and Department of Physics, University of California, Berkeley, California 94720). *Physical Review [Section] A: General Physics;* **26**: No. 4, 2117-2122(Oct 1982).

For a driven nonlinear semiconductor oscillator which shows a period-doubling pitchfork bifurcation route to chaos, we report an additional route to chaos: the Pomeau-Manneville intermittency route, characterized by a periodic (laminar) phase interrupted by bursts of aperiodic behavior. This occurs near a tangent bifurcation as the system driving parameter is reduced by ϵ from the threshold value for a periodic window. Data are presented for the dependence of the average laminar length <l> on ϵ, and also on additive random noise voltage. The results are in reasonable agreement with the intermittency theory of Hirsch, Huberman, and Scalapino. The distribution P(l) is also reported.

22572 Experiments to measure the gravitational acceleration of antimatter. Goldman, T.; Nieto, M.M. (Los Alamos National Lab., NM (USA). Theoretical Div.). *Physics Letters, [Section] B;* **112**: No. 6, 437-440(27 May 1982).

It has never been directly experimentally demonstrated that antimatter is gravitationally attracted to matter. We discuss the theoretical and experimental situation, and propose a new experiment using antiprotons.

22573 Condition of vibrational stabilizability for a class of nonlinear systems. Meerkov, S.M. (Illinois Inst. of Tech., Chicago). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Automatic Control;* **AC-27**: No. 2, 485-487(Apr 1982). Contract AC02-80ER10709.

A notion of vibrational stabilizability for a class of nonlinear systems is introduced and analyzed.

22574 Chaotic attractors of an infinite-dimensional dynamical system. Farmer, J.D. (Univ. of California, Santa Cruz). *Physica D: Nonlinear Phenomena (Amsterdam);* **4**: No. 3, 366-393(Mar 1982).

The chaotic attractors of a delay differential equation are studied. The dimension of several attractors computed directly from the definition agrees to experimental resolution with the dimension computed from the spectrum of Lyapunov exponents according to a conjecture of Kaplan and Yorke. Assuming this conjecture to be valid, as the delay parameter is varied, from computations of the spectrum of Lyapunov exponents, roughly linear increase is observed from two to twenty in the dimension, while the metric entropy remains roughly constant. These results are compared to a linear analysis, and the asymptotic behavior of the Lyapunov exponents is derived.

22575 Statistical mechanical prediction of entropies and free energy functions for small clusters of atoms. Frurip, D.J. (Argonne National Lab., IL); Blander, M.; Chatillon, C. *ACS Symposium Series;* No. 179, 207-218(1982).

Previously successful correlations of thermodynamic data for various simple gaseous molecules are extended to larger molecules. In the statistical mechanical theory one calculates the nonelectronic entropy and free energy function with good precision using as input only the interatomic distance and atomic masses. The general class of molecules MX/sub n/ $(1 \leqq n \leqq 6)$ appears to follow the predictions of the theory. When known thermodynamic data for small homonuclear clusters of atoms, X/sub n/ $(n \leqq 8)$, are tested the resulting correlations with the MX/sub n-1/ data are relatively good, further confirming the insensitivity of the entropy to the exact form of the pair potential.

22576 Magnetic field, vector potential and their derivatives due to currents in closed polygons of wire. Lee, D.K. (Oak Ridge National Lab., TN). *Computer Physics Communications;* **25**: 181-191(1982). Contract W-7405-ENG-26.

A computer program is described which evaluates the magnetic field, the magnetic reactor potential and their partial derivatives for two types of magnetic sources: (1) current-carrying straight wire of finite length and (2) current-carrying closed polygon consisting of three or more straight wires of finite length. (SC)

22577 Nonlinear mode phenomenology for sine-Gordon breather excitations. Bishop, A.R. (Los Alamos Scientific Lab., NM). *Journal of Physics, A;* **14**: 1417-1430(1981).

Hamiltonians in one space dimensions of the phi-four and sine-Gordon classes are considered, emphasizing kink- and breather-like excitations. A calculation of classical dynamic structure factors based on a kink ideal gas phenomenology is reviewed in terms of the central peaks predicted. This phenomenological scheme is extended to include breather excitations. It is suggested that, for correlations of appropriate functions, the breather excitations can give rise to a low-frequency (central) response from their particle-like envelope and a high-frequency response from their internal oscillatory motions, in qualitative accord with molecular dynamics simulations.

22578 **Solutions of the Yvon-Born-Green equation for hard discs at very high densities.** Green, K.A. (Univ. of Tulsa, OK); Luks, K.D.; Kozak, J.J. *Molecular Physics;* **43**: No. 3, 685-696(1981).

The Yvon-Born-Green equation under the superposition closure is solved for a system of hard discs at very high densities. As was found previously for the case of hard spheres, a transition from damped oscillatory g/sup (2)/(x) functions to undamped periodic g/sup (2)/(x) functions is observed. Two distinct branches of solutions, both periodic, are observed beyond the transition point. A reexamination of the YBG equation for a system of hard spheres at very high densities reveals the same type of branching phenomenon, heretofore not fully identified for the dimensionality d = 3.

22579 **Thermodynamic equations for a black planet with nearest-neighbour surface Carnot interaction.** Sertorio, L. (California Univ. (USA). Theoretical Div.; Los Alamos Scientific Lab., NM (USA)). *Nuovo Cimento della Societa Italiana di Fisica, [Sezione] C;* **3**: No. 1, 37-44(Jan-Feb 1980).

This approach provides a quantitative description of the work efficiency of a compound system that has a natural separation between entropy-producing channels and the zero-entropy channel. Within this model a generalization is obtained of the concept of Carnot efficiency no longer between two infinite reservoirs but for a structure that has an internal dynamics put into motion by an external heat source.

22580 **Energy deposition in molecules resulting from multiple infrared photon absorption.** Reiser, C.; Steinfeld, J.I. (Massachusetts Inst. of Tech., Cambridge). *Optical Engineering;* **19**: No. 1, 002-009(Jan 1980). Contract AC02-76ET33056.

The most important factor determining the response of systems to high-intensity infrared radiation is the quantity of vibrational energy deposited in the absorbing molecules. Determination of this quantity is complicated by spatial nonuniformities in the infrared radiation fluence and by distributions over energy in the system. In this paper, we obtain expressions for the infrared fluence distribution in a focused Gaussian beam. This is combined with an empirical model for the excitation function <n>(phi) to calculate energy deposition for a range of parameters. These results are compared with available experimental data on dissociation yields for sulfur hexafluoride, and also to various approximate results. Finally, we consider the advantages and limitations of several possible experimental approaches to determining the absolute excitation level of molecules and microscopic energy distributions in the focal volume of the laser beam.

22581 **Relation between the local field at large distances from a charge or dipole and the dielectric constant.** Pollock, E.L. (Lawrence Livermore Lab., CA); Alder, B.J.; Pratt, L.R. *Proceedings of the National Academy of Sciences of the United States of America;* **77**: No. 1, 49-51(Jan 1980).

The local field at large distances from a charged or dipolar impurity in a nonpolar polarizable fluid is related to the dielectric constant of the medium. The predicted local field agrees accurately with molecular dynamics results. In contrast, the usual continuum theory prediction is only accurate to first order in the polarizability and leads to serious error for realistic values of the polarizability. At smaller distances these relations cannot be used to define a physically reasonable local dielectric constant and consequently the local field is more satisfactorily described in terms of a screening function.

22582 **Elementary principles of spectral distributions.** French, J.B. (Univ. of Rochester, NY). pp 1-16 of Theory and applications of moment methods in many-fermion systems. Dalton, B.J.; Grimes, S.M.; Vary, J.P.; Williams, S.A. (eds.). New York, NY; Plenum Press (1980).

From Conference on theory and applications of moment methods in many fermion systems; Iowa City, IA, USA (10 Sep 1979).

It is a common observation that as we add particles, one by one, to a simple system, things get steadily more and more complicated. For example if the system is describable in shell-model terms, i.e., with a model space in which m particles are distributed over N single-particle states, then as long as m << N, the dimensionality increases rapidly with particle number. On the other hand, for the usual (1 + 2)-body Hamiltonian, the (m ≧ 2)-particle spectrum and wave functions are determined by operators defined in the one-particle space (for the single-particle energies) and the two-particle space (for the interactions). We may say then that the input information becomes more and more fragmented as the particle number increases, the fixed amount of information being distributed over more and more matrix elements. On the other hand there arise also new simplicities whose origin is connected with the operation of statistical laws. There is a macroscopic simplicity corresponding to the fact that the smoothed spectrum takes on a characteristic shape defined by a few parameters (low-order moments) of the spectrum. There is a microscopic simplicity corresponding to a remarkable spectral rigidity which extends over the entire spectrum and guarantees us that the fluctuations from uniformity in the spectrum are small and in many cases carry little information. The purpose of spectral-distribution theory, as applied to these problems, is to deal with the complexities by taking advantage of the simplicities.

22583 **Special topics in spectral distributions.** French, J.B. (Univ. of Rochester, NY). pp 91-108 of Theory and applications of moment methods in many-fermion systems. Dalton, B.J.; Grimes, S.M.; Vary, J.P.; Williams, S.A. (eds.). New York, NY; Plenum Press (1980).

From Conference on theory and applications of moment methods in many fermion systems; Iowa City, IA, USA (10 Sep 1979).

We discuss two problems which relate to the foundations of the subject, and a third about asymptotic properties of spectral distributions. We give also a brief list of topics which should be further explored.

22584 **Averages of operators in finite Fermion systems.** Ginocchio, J.N. (Los Alamos Scientific Lab., NM). pp 109-127 of Theory and applications of moment methods in many-fermion systems. Dalton, B.J.; Grimes, S.M.; Vary, J.P.; Williams, S.A. (eds.). New York, NY; Plenum Press (1980).

From Conference on theory and applications of moment methods in many fermion systems; Iowa City, IA, USA (10 Sep 1979).

The important ingredients in the spectral analysis of Fermion systems are the average of operators. In this paper we shall derive expressions for averages of operators in truncated Fermion spaces in terms of the minimal information needed about the operator. If we take the operator to be powers of the Hamiltonian we can then study the conditions on a Hamiltonian for the eigenvalues of the Hamiltonian in the truncated space to be Gaussian distributed. The theory of scalar traces is reviewed, and the dependence on nucleon number and single-particle states is reviewed. These results are used to show that a dilute non-interacting system will have Gaussian distributed eigenvalues, i.e., its cumulants will tend to zero, for a large number of Fermions. The dominant terms in the cumulants of a dilute interacting Fermion system are derived. In this case the cumulants depend crucially on the interaction even for a large number of Fermions. Configuration averaging is briefly discussed. Finally, comments are made on averaging for a fixed number of Fermions and angular momentum. (WHK)

22585 **Spectral distributions and symmetries.** Quesne, C. (Univ. Libre de Bruxelles, Belgium). pp 257-272 of Theory and applications of moment methods in many-fermion systems. Dalton, B.J.; Grimes, S.M.; Vary, J.P.; Williams, S.A. (eds.). New York, NY; Plenum Press (1980).

From Conference on theory and applications of moment methods in many fermion systems; Iowa City, IA, USA (10 Sep 1979).

As it is now well known, the spectral distribution method has both statistical and group theoretical aspects which make for great simplifications in many-Fermion system calculations with respect to more conventional ones. Although both aspects intertwine and are equally essential to understand what is going on, we are only going to discuss some of the group theoretical aspects, namely those connected with the propagation of information, in view of their fundamental importance for the actual calculations of spectral distributions. To be more precise, let us recall that the spectral distribution method may be applied in principle to many-Fermion spaces which have a direct-product structure, i.e., are obtained by distributing a certain number n of Fermions over N single-particle states ($O \leqq n \leqq N$), as it is the case for instance for the nuclear shell model spaces. For such systems, the operation of a central limit theorem is known to provide us with a simplifying principle which, when used in conjunction with exact or broken symmetries, enables us to make definite predictions in those cases which are not amendable to exact shell model diagonalizations. The distribution (in energy) of the states corresponding to a fixed symmetry is then defined by a small number of low-order energy moments. Since the Hamiltonian is defined in few-particle subspaces embedded in the n-particlespace, the low-order moments, we are interested in, can be expressed in terms of simpler quantities defined in those few-particle subspaces: the information is said to propagate from the simple subspaces to the more complicated ones. The possibility of actually calculating spectral distributions depends upon the finding of simple ways to propagate the information. (WHK)

22586 **Group symmetries and information propagation.** Draayer, J.P. (Louisiana State Univ., Baton Rouge). pp 287-306 of Theory and applications of moment methods in many-fermion systems. Dalton, B.J.; Grimes, S.M.; Vary, J.P.; Williams, S.A. (eds.). New York, NY; Plenum Press (1980).

From Conference on theory and applications of moment methods in many fermion systems; Iowa City, IA, USA (10 Sep 1979).

Spectroscopy concerns itself with the ways in which the Hamiltonian and other interesting operators defined in few-particle spaces are determined or determine properties of many-particle systems. But the action of the central limit theorem (CLT) filters the transmission of information between source and observed so whether propagating forward from a few-particle defining space, as is usual in theoretical studies, or projecting backward to it from measured things, each is only sensitive to averaged properties of the other. Our concern is with the propagation of spectroscopic information in the presence of good symmetries when filtering action of the CLT is effective. Specifically, we propose to address the question, What propagates and how. We begin with some examples, using both scalar and isospin geometries to illustrate simple propagation. Examples of matrix propagation are studied; contact with standard tensor algebra is established and an algorithm put forward for the expansion of any operator in terms of another set, complete or not; shell-model results for ^{20}Ne using a realistic interaction and two trace-equivalent forms are presented; and some further challenges are mentioned. (WHK)

22587 **Spectral methods applied to Ising models.** DeFacio, B. (Ames Lab., IA); Hammer, C.L.; Shrauner, J.E. pp 327-361 of Theory and applications of moment methods in many-fermion systems. Dalton, B.J.; Grimes, S.M.; Vary, J.P.; Williams, S.A. (eds.). New York, NY; Plenum Press (1980). Contract W-7405-ENG-82.

From Conference on theory and applications of moment methods in many fermion systems; Iowa City, IA, USA (10 Sep 1979).

Several applications of Ising models are reviewed. A 2-d Ising model is studied, and the problem of describing an interface boundary in a 2-d Ising model is addressed. Spectral methods are used to formulate a soluble model for the surface tension of a many-Fermion system. (WHK)

22588 **Partition function as a Laplace transform of a positive measure in the strength parameter.** Bessis, D. (Centre d'Etudes Nucleaires de Saclay, France). pp 363-369 of Theory and applications of moment methods in many-fermion systems. Dalton, B.J.; Grimes, S.M.; Vary, J.P.; Williams, S.A. (eds.). New York, NY; Plenum Press (1980).

From Conference on theory and applications of moment methods in many fermion systems; Iowa City, IA, USA (10 Sep 1979).

We shall consider the partition function Z(λ), of an N-body system whose Hamiltonian reads: H = H/sub O/ + λH/sub I/. H/sub O/ is an exactly solvable Hamiltonian, one for which, for example all thermodynamical quantities can be calculated. H/sub I/ is the perturbation. We are interested in the analytic properties in the strength parameter λ of the partition function Z(λ) = Tr e/sup -β[H_0 + λH/sub I/]/ where for convenience the volume V and inverse temperature β dependence has been suppressed on the left hand side. The representation for Z(λ) is given and discussed, and applications are described. (WHK)

22589 **Application of spectral distributions in effective interaction theory.** Chang, B.D. (Univ. of Pittsburgh, PA). pp 371-387 of Theory and applications of moment methods in many-fermion systems. Dalton, B.J.; Grimes, S.M.; Vary, J.P.; Williams, S.A. (eds.). New York, NY; Plenum Press (1980).

From Conference on theory and applications of moment methods in many fermion systems; Iowa City, IA, USA (10 Sep 1979).

The calculation of observable quantities in a large many-particle space is very complicated and often impractical. In effective interaction theory, to simplify the calculation, the full many-particle space is truncated to a small, manageable model space and the operators associated with the observables are renormalized to accommodate the truncation effects. The operator that has been most extensively studied for renormalization is the Hamiltonian. The renormalized Hamiltonian, often called the effective Hamiltonian, can be defined such that it not only gives the eigenvalues, but also the projections of the full-space (true) eigen-functions onto the model space. These projected wave functions then provide a convenient basis for renormalization of other operators. The usual framework for renormalization is perturbation theory. Unfortunately, the conventional perturbation series for effective Hamiltonians have problems with convergence and their high order terms (especially 4th or higher) are also difficult to calculate. The characteristics of spectral distributions can be helptul in determining the model space and calculating the effective Hamiltonian. In this talk applications of spectral distributions are discussed in the following areas: (1) truncation of many particle spaces by selection of configurations; (2) orthogonal polynomial expansions for the effective Hamiltonian; and (3) establishing new criteria for the effective Hamiltonian. (WHK)

6580 Mathematical Physics

REFER ALSO TO CITATION(S) 22162, 22561, 22580, 22581, 22683

22590 **(DOE/ER/10651—T1-Vol.1) Lie algebras and flexible Lie-admissible algebras. Hadronic press monographs in mathematics Number 1.** Myung, H.C. (University of Northern Iowa, Cedar Falls (USA). Dept. of Mathematics; Institute for Basic Research, Cambridge, MA (USA). Div. of Physics). Nov 1982. Contract AC02-80ER10651. 338p. NTIS, PC A15/MF A01. Order Number DE83007252.

Topics covered includes: nonassociative algebras; polynomial mappings; Lie algebras of characteristic O; split semisimple Lie algebras of characterisitic O; representations of semisimple Lie algebras; flexible Lie-admissible algebras with A^- semisimple; and Lie-admissable algebras of arbitrary characteristic. (GHT)

22591 Boundary conditions for the numerical solution of elliptic equations in exterior regions. Bayliss, A. (Langley Research Center, Hampton, VA); Gunzburger, M.; Turkel, E. *SIAM (Society for Industrial and Applied Mathematics) Journal on Applied Mathematics;* **42**: No. 2, 430-451(Apr 1982). Contract AC02-76ER03077.

Elliptic equations in exterior regions frequently require a boundary condition at infinity to ensure the well-posedness of the problem. Examples of practical applications include the Helmholtz equation and Laplace's equation. Computational procedures based on a direct discretization of the elliptic problem require the replacement of the condition at infinity by a boundary condition on a finite artificial surface. Direct imposition of the condition at infinity along the finite boundary results in large errors. A sequence of boundary conditions is developed which provides increasingly accurate approximations to the problem in the infinite domain. Estimates of the error due to the finite boundary are obtained for several cases. Computations are presented which demonstrate the increased accuracy that can be obtained by the use of the higher order boundary conditions. The examples are based on a finite element formulation but finite difference methods can also be used.

22592 Solving symmetric-definite quadratic λ-matrix problems without factorization. Scott, D.S. (Univ. of Texas, Austin); Ward, R.C. *SIAM Journal on Scientific and Statistical Computing;* **3**: No. 1, 58-67(Mar 1982). Contract W-7405-ENG-26.

Algorithms are presented for computing some of the eigenvalues and their associated eigenvectors of the quadratic λ-matrix $M \lambda^2 C \lambda + K$. M, C, and K are assumed to have special symmetry-type properties which insure that theory analogous to the standard symmetric eigenproblem exists. The algorithms are based on a generalization of the Rayleigh quotient and the Lanczos method for computing eigenpairs of standard symmetric eigenproblems. Monotone quadratic convergence of the basic method is proved. Test examples are presented.

22593 Spectral methods for a nonlinear initial value problem involving pseudo differential operators. Pasciak, J.E. (Brookhaven National Lab., Upton, NY). *SIAM (Society for Industrial and Applied Mathematics) Journal on Numerical Analysis;* **19**: No. 1, 142-154(Feb 1982). Contract AC02-76CH00016.

Spectral methods (Fourier methods) for approximating the solution of a nonlinear initial value problem involving pseudo differential operators are defined and analyzed. A semidiscrete approximation to the nonlinear equation based on an L^2 projection is described. The semidiscrete L^2 approximation is shown to be a priori stable and convergent under sufficient decay and smoothness assumptions on the initial data. It is shown that the semidiscrete method converges with infinite order, that is, higher order decay and smoothness assumptions imply higher order error bounds. Spectral schemes based on spacial collocation are also discussed.

22594 Transient solutions of the Bloch equations for inhomogeneously broadened lines. Friesner, R.; McCracken, J.L.; Sauer, K. (Lawrence Berkeley Lab., CA). *Journal of Magnetic Resonance;* **43**: 343-356(1981). Contract W-7405-ENG-48.

The transient EPR response of a spin-polarized, inhomogeneously broadened line under conditions of magnetic field modulation is determined. Numerical solutions of the Bloch equations for spin packets with off-resonance Larmor frequencies are obtained. These solutions are then demodulated, averaged over the initial phase of the field modulation cycle and the distribution of resonant frequencies to obtain the experimentally observed lineshape. The results of these calculations are characterized for both slow and rapid passage conditions, and the effects of spin relaxation and experimental parameters on the signal-averaged output of the phase-sensitive detector are described.

70 FUSION ENERGY

REFER ALSO TO CITATION(S) 20558

22595 (CFU—83/1) Fusion Energy Update: a current awareness journal. Whitson, M.O. (ed.). (Department of Energy, Oak Ridge, TN (USA). Technical Information Center). Jan 1983. 94p. NTIS.

Available on a subscription basis at $75.00 per volume (calendar) year.

Fusion Energy Update (CFU) provides monthly abstracting and indexing coverage of current scientific and technical reports, journal articles, conference papers and proceedings, books, patents, theses, and monographs for all sources on fusion energy. The subject matter covered by CFU includes plasma physics, the physics and engineering of blankets, magnet coils and fields, power supplies and circuitry, cooling systems, fuel systems, radiation hazards, power conversion systems, inertial confinement systems, and component development testing.

7001 Plasma Research

REFER ALSO TO CITATION(S) 20784, 21305, 22215, 22741, 22778, 22789, 22790

22596 (AD-A—115329/5) XUV and x-ray spectra from Texas Experimental Tokamak plasmas. Memorandum report 1981-1982. Bleach, R.D.; Burkhalter, P.G.; Nagel, D.J.; Rowan, W. (Naval Research Lab., Washington, DC (USA)). 28 May 1982. 23p. (NRL-MR—4822). NTIS, PC A02/MF A01.

The first XUV and x-ray spectra were recorded from TEXT with a grazing-incidence grating spectrograph and new crystal spectrographs. Time and space-integrated data yielded a qualitative description of the plasma. Line radiation from O, Cr, Fe, and Ni ions were recorded and identified with the aid of ab initio atomic structure calculations.

22597 (CONF-811040—192) Driver options for steady-state tokamak reactors. Ehst, D.A. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 5p. NTIS, PC A02/MF A01. Order Number DE83007858.

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

This paper presents results from two theoretical studies of wave-driven currents in large tokamaks. A lower hybrid (LH) system was designed in detail for STARFIRE, a full-scale commercial reactor. The results of this first study indicated that the LH system was workable from an engineering and maintenance viewpoint, but accessibility constraints on the wave prevented wave penetration to the high density plasma interior. In consequence, STARFIRE would have to operate with a hollow current density equilibrium which is stable at only moderate beta ($\beta = 0.067$). Generally speaking, the maximum stable beta increases as the plasma current increases and achieves a broad centrally peaked profile. Hence, to improve upon the STARFIRE results a survey of other wave drivers was conducted in order to identify those waves which more efficiently generate centrally-peaked current density. All calculations in this second study were applied to a demonstration tokamak power reactor (DEMO) which is similar to INTOR in size ($R = 5.2$ m, $a = 1.3$ m, $B_0 = 4.8$ T) but has a high current ($I = 9$ MA) and high beta ($\beta = 0.080$). The goal of our survey is to find which wave maximizes the net electrical power produced by the DEMO.

22598 (CONF-811040—194) Study of plasma-edge conditions for a commercial tokamak reactor. Boley, C.D.; Brooks, J.N. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 5p. NTIS, PC A02/MF A01. Order Number DE83007699.

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Particle and energy fluxes to the first wall and pumped limiter of a commercial-size tokamak power reactor have been studied with a one-dimensional, time-dependent plasma transport code. The plasma is operated in an enhanced radiation mode, with iodine as the high-Z impurity, whereby the transport power to the limiter is held to about half of the alpha-heating power. Recycling of neutral hydrogen and helium is followed in detail. The ion flux to the limiter and the neutral flux to the first wall are found to depend on the removal efficiency of the limiter/vacuum system. These fluxes also depend strongly on whether gas puffing or pellet injection is used for fueling.

22599 (DOE/ER/10676—3) Semi-empirical studies of atomic structure. Progress report, 1 July 1982-1 February 1983. Curtis, L.J. (Toledo Univ., OH (USA). Dept. of Physics and Astronomy). 1983. Contract AS05-80ER10676. 14p. NTIS, PC A02/MF A01. Order Number DE83006556.

A program of studies of the properties of the heavy and highly ionized atomic systems which often occur as contaminants in controlled fusion devices is continuing. The project combines experimental measurements by fast-ion-beam excitation with semi-empirical data parametrizations to identify and exploit regularities in the properties of these very heavy and very highly ionized systems. The increasing use of spectroscopic line intensities as diagnostics for determining thermonuclear plasma temperatures and densities requires laboratory observation and analysis of such spectra, often to accuracies that exceed the capabilities of ab initio theoretical methods for these highly relativistic many electron systems. Through the acquisition and systematization of empirical data, remarkably precise methods for predicting excitation energies, transition wavelengths, transition probabilities, level lifetimes, ionization potentials, core polarizabilities, and core penetrabilities are being developed and applied. Although the data base for heavy, highly ionized atoms is still sparse, parametrized extrapolations and interpolations along isoelectronic, homologous, and Rydberg sequences are providing predictions for large classes of quantities, with a precision that is sharpened by subsequent measurements.

22600 (DOE/ER/53131—T1) Quarterly technical status report, December 1, 1982-February 28, 1983. (Austin Research Associates, Inc., TX (USA)). 1983. Contract AC05-82ER53131. 19p. (I-ARA—83-U-16(ARA-481)). NTIS, PC A02/MF A01. Order Number DE83008367.

It was shown that for magnetic field strengths expected near the outer plasma edge of an INTOR device, for any passive magnetic material the linear response regime is well exceeded and the material would be completely saturated. Further, it was shown that nested shells of magnetic material is inferior to the use of a single magnetic shell. Finally, for realistic sizes the amount of field reduction obtainable is small. In summary, it was shown that use of passive magnetic material is not a viable means of obtaining field-free transport of ion beams.

22601 (DOE/ER/53134—1) Theory of rf heating of toroidal plasmas. (Auburn Univ., AL (USA). Dept. of Physics). 1982. Contract AS05-82ER53134. 75p. NTIS, PC A04/MF A01. Order Number DE83008267.

Principal accomplishments includes the completion of graphic output with color-coded multiple rays, a more extensive parameter study, a large new section of coding for focusing effects, an analytic study of a simple integrable system to help understand the failure of the WKB method at mode conversion layers, exploration of techniques for doing ray-tracing in a numerically computed equilibrium, introduction of the effects of oblique incidence on a 4th-order mode conversion problem, derivation of a Green function for a 6th-order mode conversion problem, derivation of a new system of equations governing arbitrarily high-order mode conversion layer, a new numerical technique for solving mode conversion problems, calculation of quasimode decay growth rates in the LHTOR code, a demonstration that quasimode decay may be a candidate to explain the observed lower-hybrid current drive high density cutoff, and installation of a Remote User Service Station (RUSS) for the MFECC Network.

22602 (DOE/ET/53016—80) Experimental observations of MHD instabilities in the high-beta tokamak Torus-II. Machida, M. (Columbia Univ., New York (USA)). 1982. Contract AC02-76ET53016. 105p. NTIS, PC A06/MF A01. Order Number DE83008131.

The CO_2 laser scattering and interferometry diagnostics have been used to study the MHD instabilities in the high-beta tokamak Torus-II. Detailed measurements of the density and density fluctuation profiles have been performed. In order to measure density fluctuations with wavelengths longer than 2 cm, an interferometric like, phase matching technique has been developed. The toroidal and poloidal mode numbers have been measured using a double-beam, two-position technique. Working at high-beta values, average $\beta \geqq 10\%$, we have found parameters where the growing instabilities are created or suppressed. The plasma lifetime for both cases is seen to be about the same and the loss of the plasma appears to be caused by the decay in the external fields. The growing instability parameters are within the MHD regime, and it only grows at the outer edge of the plasma. This is in agreement with the theoretical Ballooning mode instability. The frequency and mode number measurements also agree with the Kinetic theory description of Ballooning modes. The comparison with possible other modes, such as Tearing and Drift instabilities, is performed and the Ballooning growth rate is shown to be the best fit to the experimental values.

22603 (DOE/ET/53136—3) Theoretical aspects of mirror fusion. Annual progress report, 1 July 1982-31 March 1983. Nicholson, D.R.; Knorr, G.E. (Iowa Univ., Iowa City (USA). Dept. of Physics and Astronomy). Mar 1983. Contract AC02-82ER53136. 9p. NTIS, PC A02/MF A01. Order Number DE83007924.

The techniques of theoretical and computational plasma physics were applied to two important problems in mirror fusion. First, we have found that electron collisions with neutral gas play an important role in determining the leak width of a cusp confined plasma. Second, we have found that mirror plasmas are susceptible to parametric instabilities during electron cyclotron resonance heating.

22604 (GA-A—16984) Theory of lower-hybrid-current drive at low densities. Chan, V.S.; Liu, C.S.; McClain, F.W.; Rosenberg, M. (GA Technologies, Inc., San Diego, CA (USA)). Feb 1983. Contract AT03-76ET51011. 6p. (CONF-830210—1). NTIS, PC A02/MF A01. Order Number DE83006950.

From 5. topical conference on radio frequency plasma heating; Madison, WI, USA (21 Feb 1983).

Efficient toroidal current sustainment by LH waves has been demonstrated experimentally on a number of tokamaks at low densities. A theoretical model invoking the nonlinear excitation of magnetized plasma waves has been proposed to explain many interesting features observed in these experiments which include enhanced SXR, cyclotron emissions and electrostatic fluctattions. Analysis of a set of moment equations deduced from this analytical mode predicts the existence of relaxation oscillations in perpendicular temperature and plasma wave energy which have subsequently been observed experimentally in certain situations. Due to the excessive stiffness of the moment equations, it is not possible to ascertain the conditions under which relaxation oscillations will occur. It is thus necessary to resort to a detailed kinetic analysis. We have constructed a Fokker-Planck wave kinetic code which takes into account the nonlinear excitation of the plasma waves and follows the temporal evolution of these waves as well as the electron distribution during the RF current drive. Studies with the code show either relaxation oscillations or a steady-state with significantly higher plasma wave energy depending on rf power level. The details of this and other dependences and comparison with experiments will be reported.

22605 (INIS-mf—7432, pp vp) Influence of thermal motion of particles on stability of REB-plasma system. Vrba, P. (Ceskoslovenska Akademie Ved, Prague. Ustav Fyziky Plazmatu:. [nd]. (In Czech). NTIS (US Sales Only), PC A06/MF A01.

From 6. conference of Czechoslovak physicists; Ostrava, Czechoslovakia (27 Aug 1979).

22606 (INIS-mf—7432, pp vp) **Attenuation of atomic beam by plasma.** Strzondala, V. (Vysoka Skola Banska, Ostrava (Czechoslovakia)). [nd]. (In Czech). NTIS (US Sales Only), PC A06/MF A01.

From 6. conference of Czechoslovak physicists; Ostrava, Czechoslovakia (27 Aug 1979).

22607 (INIS-mf—7432, pp vp) **Dependence of the dissociative recombination coefficient of Ne_2^+ ions on neutral gas temperature.** Zabudla, Z.; Lukac, P.; Mikus, O. (Komenskeho Univ., Bratislava (Czechoslovakia). Prirodovedecka Fakulta). [nd]. (In Slovak). NTIS (US Sales Only), PC A06/MF A01.

From 6. conference of Czechoslovak physicists; Ostrava, Czechoslovakia (27 Aug 1979).

22608 (INIS-mf—7432, pp vp) **Diagnostics of low-pressure high-frequency discharges.** Kapicka, V.; Kovar, L.; Ryl, M. (Universita J.E. Purkyne, Brno (Czechoslovakia)). [nd]. (In Czech). NTIS (US Sales Only), PC A06/MF A01.

From 6. conference of Czechoslovak physicists; Ostrava, Czechoslovakia (27 Aug 1979).

22609 (INIS-SU—110, pp A-5) **Experimental observations of toroidal discharges in Ringboog 2.** Bornstein, L.Th.M.; Polman, R.W.; Barbian, E.P. (FOM-Instituut voor Atoom-en Molecuulfysica, Amsterdam (Netherlands)) (and others). 1981. NTIS (US Sales Only).

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

22610 (INIS-SU—110, pp A-8a) **Investigation of plasma contamination in the MT-1 tokamak and model experiments on high energy exfoliation.** Paszti, F.; Mezey, G.; Pogany, L. (Koezponti Fizikai Kutato Intezet, Budapest (Hungary)) (and others). 1981. NTIS (US Sales Only).

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

22611 (INIS-SU—110, pp B-1) **Rotation and island effects in tokamaks with high-power neutral beam heating.** Hogan, J. (Oak Ridge National Lab., TN (USA)). 1981. NTIS (US Sales Only).

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

22612 (INIS-SU—110, pp B-12) **Response of electrons to low-frequency modes.** Schep, T.J.; Abels van Maanen, A.; Braams, B.; Pegoraro, F. (FOM-Instituut voor Atoom-en Molecuulfysica, Amsterdam (Netherlands)). 1981. NTIS (US Sales Only).

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

22613 (INIS-SU—110, pp B-18) **Use of neutron yield measurements to study the slowing down of MeV range charged particles in JET.** Thomas, P.R.; Core, W. (JET Joint Undertaking, Abington (United Kingdom):. 1981. NTIS (US Sales Only).

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

22614 (INIS-SU—110, pp C-12) **Q-enhancement in ion-axisymmetric tandem mirror plasma.** Kammash, T.; Galbraith, D.L. (Michigan Univ., Ann Arbor (USA)). 1981. NTIS (US Sales Only).

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

22615 (INIS-SU—110, pp D-19) **Kinetic stability of Bennett pinch.** Sharma, A.S.; Krishnamurty, U.; Sen, A.; Sundaram, A.K. (Physical Research Lab., Ahmedabad (India)). 1981. NTIS (US Sales Only).

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

22616 (INIS-SU—110, pp E-13) **MHD stability observation of high-beta plasma in modified bumpy field.** Sekine, A.; Shiina, S.; Ogura, Y.; Saito, K.; Osanai, Y.; Nogi, Y.; Yoshimura, H.; Todoroki, J.; Hamada, S. (Nihon Univ., Tokyo. Coll. of Science and Engineering:. 1981. NTIS (US Sales Only).

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

22617 (INIS-SU—110, pp H-22) **Elimination of surface waves in lower hybrid wave heating.** Ushigusa, K.; Takamura, S.; Okuda, T. (Nagoya Univ. (Japan). Faculty of Engineering). 1981. NTIS (US Sales Only).

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

22618 (INIS-SU—110, pp J-3) **Nonambipolar plasma transfer in TV-1 tokamak scrape-off-layer.** Ivanov, R.S.; Nedospasov, A.V.; Fideliman, G.N. 1981. NTIS (US Sales Only).

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

22619 (INIS-SU—110, pp L-3) **Initial reversed-field experiments on ZT-40M with a metallic vacuum liner.** Baker, D.A.; Buchenauer, C.J.; Burkhardt, L.C. (and others:. 1981. NTIS (US Sales Only).

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

22620 (INIS-SU—110, pp L-5) **Experiments in the "Tor-Linear" device.** Es'kov, A.G.; Kitaev, M.I.; Kurtmullaev, R.Kh.; Novikov, V.M.; Semenov, V.I.; Strizhov, E.F. 1981. NTIS (US Sales Only).

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

22621 (INIS-SU—110, pp L-10) **Confinement and magnetoacoustic heating of a low density Belt-Pinch plasma.** Erckmann, V.; Muller, G.; Singethan, J.; Schworer, K.; Thumm, M.; Wilhelm, R. (Stuttgart Univ. (TH) (Germany, F.R.). Inst. fuer Plasmaforschung). 1981. NTIS (US Sales Only).

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

22622 **(IPP—1/209) Final report on the scientific and engineering design of a soft X-ray diode array diagnostic system for JET (KJ 1).** Fahrbach, H.U.; Goss, H.; Harmeyer, E.; Schramm, G. (Max-Planck-Institut fuer Plasmaphysik, Garching (Germany, F.R.)). Jul 1982. 50p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750189.

Reprint of IPP-JET--6.

This report describes the Soft-X-Ray Diode Array Diagnostic System for JET. It was designed by the IPP under an Article 14 contract for Phase I. The diagnostics will be capable of measuring the Soft-X-ray emission from H and D plasmas in JET with high resolution in space and time. Two slot-hole cameras with 150 detectors viewing the same toroidal cross-section of the plasma are foreseen. Thin beryllium and aluminium filters in the line of sight of the detectors allow simultaneous measurements within different limits of the X-ray spectrum. Heavy shielding against neutron and gamma radiation is provided in order to reduce radiation induced signals and to increase detector lifetimes. The signals of 100 detectors can be simultaneously sampled with a sampling rate variable up to 250 KHz and stored in 12 bit memories of about 20 Kwords size.

22623 **(LA-UR—83-413) Two parallel formulations of particle-in-cell models.** Buzbee, B.L. (Los Alamos National Lab., NM (USA)). 1982. Contract W-7405-ENG-36. 10p. (CONF-8209107—1). NTIS, PC A02/MF A01. Order Number DE83007558.

From Workshop on algorithmically-specialized computer organizations; West Lafayette, IN, USA (27 Sep 1982).

This paper discusses parallel formulation of PIC models for master/slave architectures and ring architectures. Because interprocessor communication can be a decisive factor in the overall efficiency of a parallel system, we show how to divide these models into large granules that can be executed in parallel with relatively little need for communication. We also report measurements of speed-up obtained from experiments on the UNIVASC 1100/84 and the Denelcor HEP.

22624 (LA-UR—83-463) Spheromak heating with Alfven waves. Knox, S.O.; Spencer, R.L.; Tataronis, J.A.; Kieras, C.E. (Los Alamos National Lab., NM (USA); Wisconsin Univ., Madison (USA)). 1983. Contract W-7405-ENG-36. 5p. (CONF-830210—5). NTIS, PC A02/MF A01. Order Number DE83007562.

From 5. topical conference on radio frequency plasma heating; Madison, WI, USA (21 Feb 1983).

The temperature of present spheromak plasmas will need to be raised in order to test the feasibility of the confinement concept. In addition, a spatially-selective rf heating pulse can be used to study transport. As the ohmic heating power within a spheromak can be quite large (6-MW), low frequencies where large amounts of power are available are preferred. For the Los Alamos spheromak experiment CTX, we propose to add heating energy via a shear Alfven wave resonance. This resonance can be made to occur upon a particular flux surface, thus depositing most of the energy locally. A 2-dimensional equilibrium code (toroidally symmetric) is used to establish flux surfaces and magnetic field values for the desired configuration, either with or without plasma pressure.

22625 (LBL—15672) Eikonal theory of the transition to phase incoherence. Kaufman, A.N.; Rosengaus, E. (Lawrence Berkeley Lab., CA (USA)). Feb 1983. Contract AC03-76SF00098. 7p. (CONF-830210—6). NTIS, PC A02/MF A01. Order Number DE83008396.

From 5. topical conference on radio frequency plasma heating; Madison, WI, USA (21 Feb 1983).

When a monochromatic electromagnetic wave propagates through a nonuniform plasma (of n dimensions), its refraction may be studied in terms of its family of rays in 2n-dimensional phase space (k,x). These rays generate and n-dimensional surface. Imbedded in the phase space. The wave amplitude and phase are defined on this surface. As the rays twist and separate (from the dynamics of the ray Hamiltonian), the surface develops pleats and becomes convoluted. Projection of the surface onto x-space then yields a multivalued k(x). The local spectral density, as a function of k for given x, exhibits sharp spikes at these k(x), in the ray-optics limit. The next correction yields a finite width to these spikes. As the surface becomes more and more ppleated, these spectral peaks overlap; the spectrum changes qualitatively from a line spectrum to a continuous spectrum. Correspondingly, the two-point spatial correlation function loses its long-range order, as the correlation volume contracts. This phenomenon is what we call the transition to incoherence.

22626 (NASA-TM—81339) A numerical method for solving the Vlasov equation. Satofuka, N. (National Aeronautics and Space Administration, Moffett Field, CA (USA). Ames Research Center). Feb 1982. 23p. NTIS, PC A02/MF A01.

REFS.

A numerical procedure is derived for the solution of the Vlasov-Poisson system of equations in two phase-space variables. Derivatives with respect to the phase-space variables are approximated by a weighted sum of the values of the distribution function at property chosen neighboring points. The resulting set of ordinary differential equations is then solved by using an appropriate time intergration scheme. The accuracy of the proposed method is tested with some simple model problems. The results for the free streaming case, linear Landau damping, and nonlinear Landau damping are investigated and compared with those of the splitting scheme. The proposed method is found to be very accurate and efficient.

22627 (ORNL/Sub—7676/3) Research support for plasma diagnostics on Elmo Bumpy Torus. Observations of EBT ring geometry by means of diamagnetic field measurements using a compensated ferromagnetic resonance magnetometer, and a preliminary numerical study of EBT flux penetration dynamics. Carpenter, K.H.; Booker, R.H. (Missouri Univ., Rolla (USA). Dept. of Electrical Engineering). Oct 1982. Contract W-7405-ENG-26. 116p. NTIS, PC A06/MF A01. Order Number DE83007883.

A preliminary numerical study of flux penetration dynamics has been made assuming a bumpy cylinder geometry for the EBT vacuum vessel. Estimates made by this study show that the diamagnetic signal from the rings should penetrate the vacuum vessel in a time on the order of 100 mS when the plasma is changed. This penetration time appears qualitatively reasonable.

22628 (ORNL/TM—8553) Computer data-acquisition and control system for Thomson-scattering measurements. Stewart, K.A.; Foskett, R.D.; Kindsfather, R.R.; Lazarus, E.A.; Thomas, C.E. (Oak Ridge National Lab., TN (USA)). Mar 1983. Contract W-7405-ENG-26. 30p. NTIS, PC A03/MF A01. Order Number DE83008167.

The Thomson-Scattering Diagnostic System (SCATPAK II) used to measure the electron temperature and density in the Impurity Study Experiment is interfaced to a Perkin-Elmer 8/32 computer that operates under the OS/32 operating system. The calibration, alignment, and operation of this diagnostic are all under computer control. Data acquired from 106 photomultiplier tubes installed on 15 spectrometers are transmitted to the computer by eighteen 12-channel, analog-to-digital integrators along a CAMAC serial highway. With each laser pulse, 212 channels of data are acquired: 106 channels of signal plus background and 106 channels of background only. Extensive use of CAMAC instrumentation enables large amounts of data to be acquired and control processes to be performed in a time-dependent environment. The Thomson-scattering computer system currently operates in three modes: user interaction and control, data acquisition and transmission, and data analysis. This paper discusses the development and implementation of this system as well as data storage and retrieval.

22629 (TRITA-EPP—81-05) Very strong double layers in a magnetized plasma column. Torven, S. (Royal Inst. of Tech., Stockholm (Sweden)). Dec 1981. 18p. NTIS, PC A02/MF A01.

REFS.

Observations of double layers with potential drops up to 1000 V are reported. The experiments were done in a triple plasma device where a magnetized plasma column is maintained in the central chamber by two plasma sources. Axial potential profiles are presented as well as probe measurements, showing the existence of an energetic electron beam on the high potential side of the layer. Experimental evidence of the validity of the Langmuir condition is given. The double layers are stable for a wide range of parameter values, but instabilities leading to large amplitude fluctuations can be introduced.

22630 (TRITA-EPP—81-08) High frequency probe circuits for plasma diagnostics. Lindberg, L. (Royal Inst. of Tech., Stockholm (Sweden)). Dec 1981. 29p. NTIS, PC A03/MF A01.

REFS.

Probe circuits used in quantitative measurement of high frequency electric fields in plasmas are analyzed. Badly defined circuits are shown to respond partly to potential, partly to electric field fluctuations, thus giving ambiguous results. Twin probes for electric field measurements overcome this difficulty. The design and optimum operation of a high frequency interferometer is described as well as its use in measuring the dispersion function and degree of coherence of a field created by beam-plasma interaction.

22631 (UCID—19692) Review of intense-ion-beam propagation with a view toward measuring ion energy. Garcia, M. (Lawrence Livermore National Lab., CA (USA)). 25 Aug 1982. Contract W-7405-ENG-48. 68p. NTIS, PC A04/MF A01. Order Number DE83008204.

The subject of this review is intense ion beam propagation and the possibilities of measuring time dependent ion energy in the beam. Propagation effects discussed include charge separation, charge and current autoneutralization, electron thermalization and current neutralization decay. The interaction of a plasma beam with material obstacles, like collimators, and with transverse magnetic fields is also described. Depending on beam energy, density and pulse length, these interactions can include material ablation with plasmadynamic flow and undeflected propagation across transverse magnetic fields by a polarization drift. On the basis of this review I conclude that three diagnostics: a single floating potential probe, net current probes (Faraday cups) and a Rutherford scattering spectrometer appear capable of giving prompt, time dependent ion energy measurements.

22632 **(UCID—19731) Nonlocal Boltzmann theory of plasma channels.** Yu, S.S.; Melendez, R.E. (Lawrence Livermore National Lab., CA (USA)). 3 Jan 1983. Contract W-7405-ENG-48. 24p. NTIS, PC A02/MF A01. Order Number DE83008310.

The mathematical framework for the LLNL code NUTS is developed. This code is designed to study the evolution of an electron-beam-generated plasma channel at all pressures. The Boltzmann treatment of the secondary electrons presented include all inertial, nonlocal, electric and magnetic effects, as well as effects of atomic collisions. Field equations are advanced simultaneously and self-consistently with the evolving plasma currents.

22633 **(UCRL—88541) Experiments on hot-electron ECRH in the Tandem Mirror Experiment-Upgrade.** Stallard, B.W. (Lawrence Livermore National Lab., CA (USA)). 18 Feb 1983. Contract W-7405-ENG-48. 8p. (CONF-830210—4). NTIS, PC A02/MF A01. Order Number DE83007364.

From 5. topical conference on radio frequency plasma heating; Madison, WI, USA (21 Feb 1983).

Experiments have begun on the Tandem Mirror Experiment Upgrade (TMX-U) using electron-cyclotron resonant heating (ECRH) to generate the hot electron populations required for thermal barrier operation (Energy E/sub eh/ $\sim$ 50 keV, density n/sub eh/ < 5 x 10^{12}, and hot-to-cold fraction n/sub eh/n $\sim$ 0.9). For this operation, rf power produced by 28-GHz gyrotrons is injected with extraordinary mode polarization at both fundamental and second harmonic locations. Our initial experiments, which concentrated on startup of the hot electrons, were carried out at low density (< 1 x 10^{12} cm^{-3}) where Fokker-Planck calculations predict high heating efficiency when the electron temperature (T/sub e/) is low. Under these conditions, we produced substantial hot electron populations (diamagnetic energy $>$ 400 J, E/sub eh/ in the range of 15 to 50 keV, and n/sub eh//n $>$ 0.5).

22634 **Mass resolving charge-exchange system on the poloidal divertor experiment.** Davis, S.L.; Mueller, D.; Keane, C.J. (Plasma Physics Laboratory, Princeton University, Princeton, New Jersey 08540). *Review of Scientific Instruments;* **54**: No. 3, 315-327(Mar 1983). Contract AC02-76CH03073.

The charge-exchange system used on the Poloidal Divertor Experiment is comprised of four, ten-channel, mass-resolved, charge-exchange analyzers. Each analyzer is constructed with parallel electric and magnetic fields and is calibrated over an energy range of 0.5—40 keV. The mass rejection between hydrogen and deuterium has been measured as better than 1000 to 1. For Ohmic heated discharges the system can provide single shot radial ion temperature profiles (four point) with 1-ms time resolution. For neutral beam heated discharges, complete radial and temporal profiles can be obtained in two to four shots. The system is also equipped with a vertically aimed diagnostic neutral beam to allow local ion-energy distribution measurements. This report describes the analyzer system and its calibration, and presents results from Ohmic and neutral beam heated discharges.

22635 **Generation of plasma targets for a negative ion neutralizer.** Hershcovitch, A.I.; Kovarik, V.J. (Brookhaven National Laboratory, Associated Universities, Inc., Upton, New York 11973). *Review of Scientific Instruments;* **54**: No. 3, 328-331(Mar 1983).

Hollow cathode discharge plasmas have been generated in a closed-loop, D-shaped solenoidal magnetic field. This configuration, which is adequate to serve as a neutralizer in a negative ion based neutral beam line, was used to generate argon and hydrogen plasma neutralizer targets. Based on scaling of the observed power dependence of target thickness, this neutralizer concept should be very attractive for application to neutral beam systems.

22636 **Frozen magnetic flux in a tokamak discharge.** Osborne, T.H.; Dexter, R.N.; Prager, S.C. (Department of Physics, University of Wisconsin, Madison 53706). *Physics of Fluids;* **26**: No. 2, 350-351(Feb 1983).

The magnetic flux at the center and the safety factor profile are found to remain stationary (or frozen) during the rapid change in electron temperature that accompanies the sawtooth oscillation. This is consistent with the classical expectation.

22637 **Rigid ballooning modes in tandem mirrors.** Kaiser, T.B.; Nevins, W.M.; Pearlstein, L.D. (Lawrence Livermore National Laboratory, University of California, Livermore, California 94550). *Physics of Fluids;* **26**: No. 2, 351-353(Feb 1983). Contract W-7405-ENG-48.

Stability of tandem mirrors to rigid-displacement ballooning modes is studied using vacuum field geometry. Results show substantial improvement in values of beta over those predicted by "infinite-m" theory. Previous work has shown that kinetic effects stabilize these latter short-wavelength modes, suggesting that only the rigid mode survives.

22638 **Observation of suprathermal electrons produced by stimulated Raman scattering processes.** Berger, R.G.; Brooks, R.D.; Pietrzyk, Z.A. (Aerospace and Energetics Research Program, University of Washington, Seattle, Washington 98195). *Physics of Fluids;* **26**: No. 2, 354-356(Feb 1983). Contract AS08-81DP40137.

Fast electrons (with $E >> T$/sub e/) have been observed as pulses correlated in time with stimulated Raman backscatter pulses during CO_2 laser interaction with cold underdense plasmas. Time-integrated electron spectra have a Maxwellian energy distribution, with discharge to discharge temperatures of 29—105 keV. Because the density is less than quarter critical and suprathermal electrons are seen only during discharges when stimulated Raman scattering occurs, it is concluded that Raman processes create the hot electrons.

22639 **Ion-cyclotron resonance heating in a strongly inhomogeneous magnetic field.** Nozaki, K.; Fried, B.D.; Morales, G.J.; Fukuyama, A. (University of California, Department of Physics, Los Angeles, California 90024). *Physics of Fluids;* **26**: No. 2, 487-495(Feb 1983).

Single particle ion-cyclotron resonance heating in a strongly inhomogeneous magnetic field with constant scale length κ^{-1} is studied for a uniform rf field. Because the ion-cyclotron frequency is energy dependent, ions get out of resonance, exhibiting superadiabatic response with no time-averaged energy gain. However, the anharmonicity of the motion results in resonances at multiple energy values, and for rf field amplitudes above a critical value E/sub c/, these resonances overlap, resulting in stochastic heating. Explicit analytic expressions are given for the particle orbits and for E/sub c/ as a function of energy and rf frequency.

22640 **Transport and isomorphic equilibria.** Boozer, A.H. (Plasma Physics Laboratory, Princeton University, Princeton, New Jersey 08544). *Physics of Fluids;* **26**: No. 2, 496-499(Feb 1983). Contract AC02-76CH03073.

It is shown that large classes of plasma equilibria can have identical drift orbits and associated transport. Such equilibria are called isomorphic. In particular, the neoclassical coefficients are given for all equilibria in which the magnetic field strength depends on one helicity.

22641 **Magnetohydrodynamic and double adiabatic stability of compact toroid plasmas.** Grossmann, W.; Hameiri, E.; Weitzner, H. (Courant Institute of Mathematical Sciences, New York University, New York, New York 10012). *Physics of Fluids;* **26**: No. 2, 508-519(Feb 1983). Contract AC02-76ER03077.

The linear stability of compact toroids is examined in the magnetohydrodynamic and double adiabatic models. The long-thin approximation in ideal magnetohydrodynamics is used to investigate tilting and shifting modes in field reversed configurations without toroidal fields. A necessary and sufficient condition is obtained and used to show that the combination of flux surface shaping and profile flatness results in stability to a class of transverse modes in a region about the O point. The double adiabatic model yields for general confined plasmas a sufficient condition for stability in the form of six ordinary differential equations along each field line. Further reduction of the condition to a single second-order equation depends on the sign of partialS/partialB, where S(psi,B) = p/sub parallel/B^5/p^3/sub perpendicular/ is a combination of the two entropies. Strong stabilizing effects of pressure anisotropy are shown.

22642 **Some minimum-energy toroidal equilibria.** Bhattacharjee, A.; Wiley, J.C. (Institute for Fusion Studies, The University of Texas at Austin, Austin, Texas 78712). *Physics of Fluids;* **26**: No. 2, 520-525(Feb 1983). Contract AC05-76ET53036;FG05-80ET53088.

Equilibria with minimum energy are constructed from a variational principle in which the energy of a plasma is minimized subject to a recently proposed set of global invariants. The equilibrium equation is solved in axisymmetric, toroidal geometry. In order to compute toroidal equilibria the variational principle is exploited to obtain a reduced set of ordinary differential equations which we solve numerically. Tokamaklike and pinchlike solutions of minimum energy are found in toroidal geometry. Based on the ideal and resistive stability studies of the cylindrical limit of these solutions, it is argued that some of these equilibria should have robust stability to modes of low m and n number.

22643 **Energy principle with global invariants: Applications.** Bhattacharjee, A.; Dewar, R.L.; Glasser, A.H.; Chance, M.S.; Wiley, J.C. (Institute for Fusion Studies, University of Texas at Austin, Austin, Texas 78712). *Physics of Fluids;* **26**: No. 2, 526-534(Feb 1983). Contract FG05-80ET53088.

Minimum-energy equilibrium states of a pressureless cylindrical plasma are constructed subject to a recently proposed set of constraints appropriate to turbulent relaxation dominated by a tearing mode of single helicity. Stability to ideal and resistive modes is examined. It is found that the relaxed states of minimum energy are always stable to the dominant mode, as well as a class of other low m and n modes, but that there are typically high n residual instabilities in the case of the pitch branch, and a residual m = 3, n = 2 resistive instability is found for an otherwise stable narrow window in the tokamak branch. It is argued that the residual instabilities may be compatible with experimental observations.

22644 **Confinement of a high-beta plasma column.** Brunel, F.; Tajima, T. (Institute for Fusion Studies, University of Texas at Austin, Austin, Texas 78712). *Physics of Fluids;* **26**: No. 2, 535-544(Feb 1983). Contract AM03-76SF00010.

Hydromagnetic aspects of confinement of a high-beta linear plasma column, including the reverse field configurations, are investigated. The previous theoretically predicted diverging confinement time of a sharp-boundary plasma column as $\beta \rightarrow 1$ is removed by properly taking into account the magnetic tension effect near the column throats. The obtained end loss rate is tested through simulation: the present simulation results in slab geometry are in good agreement with theory and are also close to other simulation and experimental values. The confinement time tau of a plasma with thickness a and length L at $\beta = 1$ is found to be tau = 3/4 (3/2π)/sup 1/2/(L/2c/sub s/)(L/a)/sup 1/2/. When the magnetic field inside the column is reversed, the plasma end loss much improves: the end loss induces the reconnection of the field lines near the throats, which produces closed field lines (islands). Those islands are found to be unstable against the tilting instability. The tilting-induced reconnection of the island field line and the mirror field line is a very fast process even for negligibly resistive plasmas and this helps to rapidly spill out the plasma confined in the islands. The significance of these processes for the spheromaks and reversed field (theta) pinches is discussed.

22645 **Gyrokinetic approach in particle simulation.** Lee, W.W. (Plasma Physics Laboratory, Princeton University, Princeton, New Jersey 08544). *Physics of Fluids;* **26**: No. 2, 556-562(Feb 1983). Contract AC02-76CH03073.

A new scheme for particle simulation based on the gyrophase-averaged Vlasov equation has been developed. It is suitable for studying linear and nonlinear low-frequency microinstabilities and the associated anomalous transport in magnetically confined plasmas. The scheme retains the gyroradius effects but not the gyromotion; it is, therefore, far more efficient than conventional ones. Furthermore, the reduced Vlasov equation is also amenable to analytical studies.

22646 **Determination of electron and ion thermal conductivities by analysis of Alcator-A profile data.** Liewer, P.C.; Pfeiffer, W.; Waltz, R.E. (Department of Applied Physics, California Institute of Technology, Pasadena, California 91125). *Physics of Fluids;* **26**: No. 2, 563-570(Feb 1983). Contract AM03-76SF00767.

Profile data from the Alcator-A tokamak are analyzed using the onetwo transport code to study thermal conductivities and power balance. It is found that the observed central ion temperatures can be explained by assuming an ion thermal conductivity equal to the neoclassical value as calculated recently by Bolton and Ware. For low density, n-bar = 1 x 10^{14} cm^{-3}, the possible anomaly in the ion conductivity is small: +- 30% of the Bolton—Ware value. The anomalous electron thermal conductivity as deduced from the profile data is <K/sup exp//sub e/> = <nchi/sup exp//sub e/> ≅2.5(+- 1.5) x 10^{17} cm^{-1} sec^{-1}. The power balance study shows that at low densities, electron energy losses from radiation and thermal conduction are equally important, and both are larger than the exchanges loss to the ions. At higher densities, n-bar> or =2 x 10^{14} cm^{-3}, electron energy losses by thermal conduction and exchange are equally important, and both are larger than the radiation loss. Convective losses, as calculated from measured particle confinement times, are negligible for all densities analyzed.

22647 **Time-resolved observations of stimulated Raman scattering from laser-produced plasmas.** Turner, R.E.; Phillion, D.W.; Campbell, E.M.; Estabrook, K. (University of California, Lawrence Livermore National Laboratory, Livermore, California 94550). *Physics of Fluids;* **26**: No. 2, 579-581(Feb 1983). Contract W-7405-ENG-48.

Temporally and spectrally resolved measurements of stimulated Raman scattering from high-intensity, 0.532 μm laser—plasma experiments on disk targets are reported. The observed scattering is principally from densities below quarter-critical, and is observed to occur nearly simultaneously over a wide range of wavelengths (0.72 $\mu m < \lambda < 0.9$ μm), in short (<50 psec) bursts. Several possible explanations of these data are briefly discussed.

22648 **Frequency-shift of self-trapped light.** Langdon, A.B.; Lasinski, B.F. (Lawrence Livermore National Laboratory, University of California, Livermore, California 94550). *Physics of Fluids;* **26**: No. 2, 582-587(Feb 1983). Contract W-7405-ENG-48.

A decrease in the frequency of self-trapped light by as much as a factor of two has been observed in computer simulations of several physical situations. The frequency shift is due to a decrease in the resonant frequency of the plasma cavity as it deepens and expands shortly after the light becomes trapped. Three examples are presented: a model problem in an initially uniform plasma, trapping of laser light in cavities at critical density, and modulational instability and self-trapping of Raman-scattered light at quarter-critical density in a nonuniform, expanding plasma. This effect is essential in the analysis of the evolution and stability of such cavities, and such large frequency changes limit the applicability of models using a nonlinear Schroedinger equation to represent the high-frequency fields.

22649 **Method and apparatus for the formation of a spheromak plasma.** Furth, H.P.; Stix, T.H.; Todd, A.M.; Yamada, M. (to Dept. of Energy). US Patent 4,363,776. 14 Dec 1982. Filed date 30 Jul 1980. vp.

PAT-APPL-173555.

A method and apparatus for forming a detached, compact toroidally shaped spheromak plasma by an inductive mechanism. A generally spheroidal vacuum vessel houses a toroidally shaped flux ring or core which contains poloidal and toroidal field generating coils. A plasma discharge occurs with the pulsing of the toroidal field coil, and the plasma is caused to expand away from the core and toward the center of the vacuum vessel. When the plasma is in an expanded state, a portion of it is pinched off in order to form a separate, detached spheromak plasma configuration. The detached plasma is supported by a magnetic field generated by externally arranged equilibrium field coils.

22650 **Influence exerted by the plasma edge potential on recycling, sputtering and impurity accumulation.** Oren, L.; Keller, L.; Schwirzke, F.; Talmadge, S.; Taylor, R.J. (California Univ., Los Angeles (USA). Center for Plasma Physics and Fusion Engineering). *Journal of Nuclear Materials;* **111**: 34-38(Nov-Dec 1982). Contract AM03-76SF00010.

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN, USA (3 - 7 May 1982).

Control of the plasma edge potential appears to influence the overall impurity evolution and transport in a tokamak. The plasma in Macrotor usually assumes a positive potential with respect to the wall. Reversed radial electric fields can be set up by biasing the magnetic surfaces at the edge negative. The resulting negative potential well of up to -800 V is rather uniform in toroidal and poloidal directions. Impurities are observed to accumulate in the plasma with no sign of recycling under these conditions. Steady state is only observed for positive potentials accompanied by sputtering and rapid recycling.

22651 **Edge plasma transport experiments in the Caltech tokamak.** Zweben, S.; Liewer, P.C.; Gould, R.W. (California Inst. of Tech., Pasadena, CA (USA). Dept. of Applied Physics). *Journal of Nuclear Materials;* **111**: 39-43(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN, USA (3 - 7 May 1982).

This paper describes two experiments on edge plasma transport in the Caltech Research Tokamak (Bsub(T) = 4 kG, R = 45 cm, a = 15 cm, T(edge) approx. equal to 25 eV, n(edge) approx. equal to 2 x 10^{12} cm^{-3}). The first aims to understand the mechanism of edge plasma cross-field transport by attempting to measure with Langmuir probes the local E tilde and n and their correlation in order to compute the fluctuation-induced particle flux GAMMAsub(rad) = c x <E tildesub(pol) x n >/Bsub(T). The second experiment aims at demonstrating control of the plasma-limiter interaction through use of a local divertor coil mounted inside the limiter itself.

22652 **Impurity-induced desorption mechanism for releasing light impurities in Tokapole II.** Brickhouse, N.S.; Dexter, R.N. (Wisconsin Univ., Madison (USA)). *Journal of Nuclear Materials;* **111**: 50-55(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN, USA (3 - 7 May 1982).

The release mechanism for light impurities in Tokapole II, a tokamak with a four-node poloidal divertor, has been characterized through impurity gas puffing experiments. The desorption process responsible for the light impurity concentrations during the current-rise phase of the discharge depends on the mass of the particles in the discharge. During switch-over from H_2 to D_2 filling gas the oxygen concentration increases as the deuterium-to-hydrogen ratio increases. Puffing with small but increasing amounts of any gas studied (H_2, D_2, He, N_2, O_2, Ne, Ar, Kr, Xe) usually produces linear increases in the early-time radiation of O, C, and N. These impurity increases are proportional to the mass of the injected impurity as might be expected for a momentum transfer process. O and N signals increase faster than linearly with concentration of O_2 and N_2, respectively, since both dopant-induced desorption and direct population of the plasma and wall occur. A model for early-time desorption is discussed.

22653 **Dye laser fluorescence spectroscopy on the Doublet III tokamak.** Muller, C.H. III; Eames, D.R.; Burrell, K.H. (General Atomic Co., San Diego, CA (USA)); Bates, S.C. (Oak Ridge National Lab., TN (USA)). *Journal of Nuclear Materials;* **111**: 56-60(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN, USA (3 - 7 May 1982).

Measurements of edge-region TiI impurity densities and central-region deuterium (n = 2) densities have been obtained in the Doublet III tokamak using laser-induced fluorescence spectroscopy. TiI densities range from 10^{12} to 10^{13} m^{-3} in ohmically heated D_2 discharges and a factor of 2-5 times less in H_2 discharges. Edge-region TiI equilibration times following neutral-beam injection are in good agreement with central-region ion confinement times suggesting that energetic charge-exchange neutrals from the plasma center are responsible for TiI impurities. Resonance fluorescence scattering from deuterium atoms in the plasma center has been observed using a broadband (8 nm) dye laser source and a narrow band detector to investigate the feasibility of determining ion temperatures.

22654 **Measurement of the density and velocity distribution of sputtered Al in EBT-S by laser-induced fluorescence.** Dullni, E.; Hintz, E. (Bochum Univ. (Germany, F.R.); Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.)); Roberto, J.B.; Colchin, R.J.; Richards, R.K. (Oak Ridge National Lab., TN (USA)). *Journal of Nuclear Materials;* **111**: 61-66(Nov-Dec 1982). Contract W-7405-ENG-26.

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN, USA (3 - 7 May 1982).

The density and the velocity distribution of neutral Al released from the vacuum wall in the EBT-S fusion device have been measured using laser-induced fluorescence. Al I was excited at the 308 nm resonance transition using a frequency-doubled dye laser. Absolute Al-densities (approx. equal to $10^{8}/cm^{3}$) were determined at distances between 5 cm and 14 cm from the wall and for various plasma conditions, by comparison of the intensity of induced fluorescence with that obtained from Rayleigh scattering. Al-velocity distributions perpendicular to the wall were determined by scanning the laser through the Doppler-broadened absorption line. The influence of geometry and ionization on the shape of the distributions is given special attention to. From these distributions mean velocities were derived (approx. equal to 2.6 x 10^{5} cm/s), and along with the measured densities Al-fluxes were calculated. The results indicate sputtering, the possible mechanisms of which are discussed.

22655 **Infrared thermometer for tokamak limiter surface temperature measurements.** Ulrickson, M.; Pearson, G.G. (Princeton Univ., NJ (USA). Plasma Physics Lab.). *Journal of Nuclear Materials;* **111**: 91-94(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN, USA (3 - 7 May 1982).

A device has been constructed which achieves about 7 ms time response for taking two dimensional limiter surface temperatures in the range 100°C to 3000°C. The instrument is capable of two color measurements which permits in situ determination of the infrared emissivity under the restrictions discussed above. The accuracy and temporal response are adequate for tokamak experiments.

22656 **Calorimeter probe studies of PDX and PLT.** Manos, D.M.; Budny, R.; Satake, T.; Cohen, S.A. (Princeton Univ., NJ (USA). Plasma Physics Lab.). *Journal of Nuclear Materials;* **111**: 130-136(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN, USA (3 - 7 May 1982).

Using a combined electrostatic-calorimeter probe, a comprehensive survey of energy flux in the edge plasmas of low field ohmic and beam-heated PDX and PLT discharges has been made. Ions are shown to carry the majority of the power to floating probes. The intercepted energy is found to increase nearly linearly with applied heating power. The scrape-off distances, ranging from 0.5 cm for a 4 null diverted discharge to 2.5 cm for inside dee diverted discharge, are independent of heating power. Direct evidence is presented for the prompt loss to the walls and limiters in PDX of energetic beam ions.

22657 **Determination of species yield of ion sources used for intense neutral beam injector.** Tsai, C.C.; Barnett, C.F.; Haselton, H.H.; Langley, R.A.; Stirling, W.L. (Oak Ridge National Lab., TN (USA). Fusion Energy Div.). *Journal of Nuclear Materials;* **111**: 153-158(Nov-Dec 1982). Contract W-7405-ENG-26.

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN, USA (3 - 7 May 1982).

For efficient plasma heating, ion sources of neutral beam injectors should be capable of producing ion beams with an atomic fraction of 90% or higher. Diagnostic techniques for quantitatively determining source species yield have been developed and evaluated. These include a magnetic momentum analysis of the unneutralized ions passing through the neutralizer, an energy analysis of the atomic beam by electrostatic separation of ions emanating from a stripping cell, and a quantity versus implantation depth analysis of hydrogen implanted in a crystal by the Secondary Ion Mass Spectrometer (SIMS) technique. The operational features and the advantages and disadvantages of each technique will be discussed. If the effects of beamlet optics, energy straggling in the accelerator, and neutralizer gas scattering are taken into account, the results of the measurements using the three techniques are shown to be mutually consistent within experimental error.

22658 **Deposition probe measurements in EBT-S.** Zuhr, R.A.; Clausing, R.E.; Heatherly, L.; Richards, R.K. (Oak Ridge National Lab., TN (USA)). *Journal of Nuclear Materials;* **111**: 177-179(Nov-Dec 1982). Contract W-7405-ENG-26.

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN, USA (3 - 7 May 1982).

Aperture transmission onto deposition probe substrates has been shown to be a useful technique for plasma edge measurements even on a machine of relatively low ion energy like EBT-S. Although the method was not sensitive enough to completely unfold the ion energy distribution, a good fit to the data was achieved using a 20 eV Maxwellian with a 3 kT sheath potential. Thus the technique was used to make the first determination of ion flux and energy (approx. equal to 1 x 10^{17}/cm^2 s at 20 eV, Maxwellian) at the outer edge of the EBT plasma, resulting in a density of approx. equal to 1 x 10^{11}/cm^3, which is in reasonable agreement with edge densities anticipated from line average densities of approx. equal to 1 x 10^{12}/cm^3 as measured by microwave interferometry.

22659 **N-dependence in the classical one-component plasma Monte Carlo calculations.** Slattery, W.L.; Doolen, G.D.; DeWitt, H.E. (Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Physical Review* [*Section*] *A: General Physics;* **26**: No. 4, 2255-2258(Oct 1982).

We calculate the internal energy of the classical one-component plasma using a Monte Carlo technique for 128, 250, 432, 686, and 1024 particles for $1<\Gamma<300$ in order to determine the effect of a differing number of particles on the thermodynamics. By fitting the internal energy to a function of Γ and N (the particle number), we find the free energy for both the liquid and solid for an infinite number of particles.

22660 **Laser-wavelength dependence of mass-ablation rate and heat-flux inhibition in laser-produced plasmas.** Fabbro, R.; Fabre, E.; Amiranoff, F.; Garban-Labaune, C.; Virmont, J.; Weinfeld, M.; Max, C.E. (Groupe de Recherches Coordonnees I.L.M., Laboratoire de Physique des Milieux Ionises, Ecole Polytechnique, 91128 Palaiseau Cedex, France). *Physical Review* [*Section*] *A: General Physics;* **26**: No. 4, 2289-2292(Oct 1982).

Thin-foil experiments at 1.06, 0.53, and 0.26 μm have been realized in order to measure mass-ablation rate m^0 as a function of absorbed laser flux phi/sub a/ and laser wavelength λ. The results can be put in the form m^0(kg/s cm^2)roughly-equal110 [phi/sub a/ (W/cm^2)/10^{14}]/sup 1/3/ λ/sup -4/3//sub mum/. Hydrodynamical simulations of these experiments show that heat-flux inhibition occurs at each wavelength, but the mechanisms are very different.

22661 **VMOMS - A computer code for finding moment solutions to the Grad-Shafranov equation.** Lao, L.L.; Wieland, R.M.; Houlberg, W.A.; Hirshman, S.P. (Oak Ridge National Lab., TN (USA)). *Computer Physics Communications;* **27**: No. 2, 129-146(Aug 1982).

This code finds approximate solutions to the Grad-Shafranov equation describing scalar pressure-balance equilibria for axisymmetric tokamak plasmas. A Fourier series expansion of the flux surface coordinates (R, Z) is made in terms of two new coordinate (rho, theta), and the resulting equation is convenieF reduced to a system of ordinary differential equations (ODE's) using a variational principle. The solution of these simple equations with pressure and current as driving functions yields, in principle, a complete description of the equilibrium.

22662 **One and one and one half dimensional profile calculations in torodial plasmas.** Baxter, D.C.; Byrne, R.N. (Science Applications, Inc., P.O. Box 2351, La Jolla, CA 92037). *Transactions of the American Nuclear Society;* **41**: 319(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

22663 **Finite temperature and wall effects on the absorption of electron cyclotron waves in an EBT plasma.** Uckan, T. (Oak Ridge National Lab., TN). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Plasma Science;* **PS-9**: No. 3, 96-101(Sep 1981). Contract W-7405-ENG-26.

The absorption of electron cyclotron waves propagating along an externally applied magnetic field in a uniform plasma surrounded by a cylindrical metallic cavity wall is studies. In the model, the cavity wall, the vacuum-plasma interface, and the effects of finite electron temperature are considered, and the dispersion relation for the wave propagation is derived. The results are than applied to the ELMO Bumpy Torus (EBT-I) plasma, and the propagation characteristics are computed. The wave absorption in the ordinary mode is found to be a result of the wall effects, which cannot be predicted with the infinite plasma theory. The loaded quality factor Q/sub L/ is also estimated from the model to be about 14, which is in good agreement with the experimentally observed value.

22664 **Alternative lines with magnetic plasma confinement.** Wobig, H. (Max-Planck-Institut fuer Plasmaphysik, Garching (Germany, F.R.)). pp vp of Annual meeting on nuclear technology '81. Specialists' meeting: Fusion. Eggenstein-Leopoldshaften, Germany; Fachinformationszentrum Mathematik (1981). (In German)

From Annual meeting on nuclear technology; Dusseldorf, F.R. Germany (24 Mar 1981).

Plasma confinement with the aid of a magnetic field is the most common and also the most frequently investigated principle on the way to controlled nuclear fusion. Apart from the Tokamak principle, which is the most advanced principle as far as fusion-relevant plasma parameters are concerned, also other approaches are being investigated, e.g. the mirror device, the bumpy tons, and the stellarator. In principle, all three concepts permit 'stationary' plasma confinement in a stationary fusion reactor. Compared with the pulsed Tokamak reactor, this is a considerable advantage. (orig./GG).

22665 Neutral-beam-induced alteration in impurity transport. Burrell, K.H. pp 113-115 of IAEA Technical Committee meeting on divertors and impurity control. Keilhacker, M.; Daybelge, U. (eds.). Garching, Germany; Max-Planck-Institut fuer Plasmaphysik (1981).

From IAEA Technical Committee meeting on divertors and impurity control in tokamaks; Garching (Germany, F.R.) (6 - 9 Jul 1981).

One of the techniques proposed for expelling impurities from plasma is based on the use of the momentum from a neutral beam. The purpose of the present work is to review the experimental results and then set forth an extension of the rotation theory that seems to be able to match the data qualitatively and quantitatively. (This theory contains no free parameters.) As a serendipitous result, this theory, coupled with the neoclassical theory of intrinsic plasma rotation, appears to be able to explain the difference between the long term confinement of injected silicon in Ohmic ISX-B discharges and the much shorter confinement seen in ALCATOR A.

22666 Impurity transport in the ISX-B tokamak. Isler, R.C.; Murray, L.E.; Kasai, S.; Sheffield, J. pp 128 of IAEA Technical Committee meeting on divertors and impurity control. Keilhacker, M.; Daybelge, U. (eds.). Garching, Germany; Max-Planck-Institut fuer Plasmaphysik (1981).

From IAEA Technical Committee meeting on divertors and impurity control in tokamaks; Garching (Germany, F.R.) (6 - 9 Jul 1981).

Recent theoretical calculations indicate that co-injection of neutral beams can inhibit impurity accumulation, but counter-injection can enhance accumulation.

22667 Helium transport experiments in PLT. Chrien, R.E.; Eubank, H.P.; Meade, D.M.; Strachan, J.D. pp 132 of IAEA Technical Committee meeting on divertors and impurity control. Keilhacker, M.; Daybelge, U. (eds.). Garching, Germany; Max-Planck-Institut fuer Plasmaphysik (1981).

From IAEA Technical Committee meeting on divertors and impurity control in tokamaks; Garching (Germany, F.R.) (6 - 9 Jul 1981).

The central ^{3}He density was deduced from the ratio of the measured ^{3}He(d,p)α and d(d,d(d,n)^{3}He fusion reaction rates during deuterium neutral beam injection into PLT plasmas.

22668 Rf-assisted current startup in FED. Borowski, S.K.; Peng, Y.K.M.; Kammash, T. (Oak Ridge Natl Lab, TN, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 507-510(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Auxiliary rf heating of electrons before and during the current rise phase in FED is examined as a means of reducing both the initiation loop voltage and resistive flux expenditure during startup. Prior to current initiation, 1 to 2 MW of electron cyclotron resonance heating (ECRH) power at approximately 90 GHz is used to create a small volume of high conductivity plasma near the upper hybrid resonance (UHR) region. This plasma conditioning permits a small radius (a/sub o/ approximately 0.2-0.4 m) current channel to be established with a relatively low initial loop voltage (<25 V). During the subsequent plasma expansion and current ramp phase, additional rf power is introduced to reduce volt-second consumption due to plasma resistance. The physics models used for analyzing the UHR heating and current rise phases are also discussed.

22669 Plasma engineering analyses of tokamak reactor operating space. Houlberg, W.; Attenberger, S.E. (Oak Ridge Natl Lab, TN, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 688-691(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A comprehensive method is presented for analyzing the potential physics operating regime of fusion reactor plasmas with detailed transport codes. Application is made to the tokamak Fusion Engineering Device (FED). The relationships between driven and ignited operation and supplementary heating requirements are examined. The reference physics models give a finite range of density and temperature over which physics objectives can be reached. Uncertainties in the confinement scaling and differences in supplementary heating methods can expand or contract this operating regime even to the point of allowing ignition with the more optimistic models.

22670 Plasma losses from a magnetic well. Kutbi, I.I.; Valfells, A. (Iowa State Univ, Ames, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 704-707(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The particle losses from a magnetic well having an octahedral symmetry are considered. The cusp, classical diffusion, and Bohm diffusion losses are computed. Results show that: Cusp losses can be compensated for by ion beam in the Hershkowitz equation prevails. Otherwise, the losses will have to be diminished by some other means; Classical diffusion losses are relatively small; and Bohm diffusion losses are very large, should it prevail, but that is unlikely to be the case in the configuration under consideration.

22671 Production of hollow gas cylinder and pulsed gas insulated discharge. Miyamoto, T.; Yoshioka, N.; Sogo, N.; Sato, M.; Kobatga, T. (Nihon Univ, Tokyo, Japan). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1905-1908(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A method to create a hollow gas cylinder with a high density gradient using supersonic gas flows is pressure gas cylinder which is transient but steady enough for a pulsed discharge.

22672 Electrical design of a multi-channel far infrared interferometer for TFTR. Anderson, H.; Johnson, L.C.; Mansfield, D.K. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1063-1066(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The Multichannel Far Infra-Red Interferometer (MIRI) is one of the many diagnostics on TFTR. It will be used to simultaneously measure line average electron density and poloidal field distributions along ten vertical chords at a single azimuthal location. Maximum expected values are 5 x 10/sup 1/4 electrons/cm/sup 3/ and /plus or minus/5 x 10/sup 3/ Gauss (+35?20/degree/Faraday rotation). This paper describes the design of the MIRI control and processing electronics.

22673 Miri - a multichannel far infra-red interferometer for TFTR. Foote, V.S. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1067-1070(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

One of the primary diagnostics for TFTR will be a far infrared (119/mu/m) interferometer to provide temporally and spatially resolved measurements of electron density along ten vertical chords through the plasma in one radial plane. In addition, the system will provide means for measuring poloidal field distributions by detecting the plasma-induced Faraday rotation of the polarized probing beams. The optical and mechanical arrangement of this diagnostic are briefly described, showing its evolution from the single-channel prototype in successful operation on the PDX device at Princeton.

22674 Mechanical design of epithermal neutron diagnostic for TFTR. Groo, R.C. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1082-1085(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The mechanical design of the Epithermal Neutron Diagnostic for TFTR is described. This fission detector system measures the time resolution of the neutron flux for folding into the Neutron Activation system and also provides continuous, wide range coverage of all expected fusion reaction rates.

22675 Diagnostics for TFTR first plasma. Goldfarb, S.; Young, K.M. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* No. 81, 1106-1109(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

TFTR will be operated initially with ohmic heating only. During the first year, as additional equipment comes into operation, the plasma parameters will improve with a plasma current of about 1 MA anticipated before installation of neutral beam heating. The diagnostics described in this paper provide the information necessary for interpreting plasma properties and for verifying diagnostic interfaces for the full diagnostic system of which these diagnostics are a subset. A further, but less important, objective is that initial diagnostics be installed easily, because of the short time scheduled for this activity between tokamak vacuum tests and first plasma. The diagnostics selected for initial operation of TFTR are listed with a statement of function and status at first plasma. The initial configuration of TFTR is briefly described and the general arrangement of diagnostics for first plasma is illustrated.

22676 Mechanical design of an x-ray pulse-height analysis system for TFTR. Moshey, E.A.; Martinez, E. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1118-1121(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The TFTR X-Ray Pulse-Height Analyzer (PHA) is used to measure the plasma soft x-ray emission in the 1-60 keV region. The time-dependent spatial profiles of the x-ray spectrum provide a measure of the electron temperature and high-Z impurity concentrations. The TFTR system will ultimately consist of 12 Pulse-Height Analyzers viewing vertically upward. The PHA System spans the TFTR Vacuum Vessel radially on five inch to eleven and one-half inch centers. This paper describes the mechanical aspects of a typical, single, PHA assembly which will be part of a 12 assembly system. The paper concentrates on the Day-1 PHA Systems.

22677 Mechanical design of an x-ray imaging system for TFTR. Moshey, E.A. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1126-1129(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The X-Ray Systems (XIS) described herein will operate on TFTR during hydrogen (HH and DH) and Deuterium (DD) discharges only. This paper describes the mechanical aspects of the design of an XIS which serves as a multi-function instrument for determining how well plasma discharges are proceeding by monitoring profiles of x-ray emission in order to: (a) measure the major radius position of the plasma by viewing from above along 76 chords, (b) measure the vertical position of the plasma by viewing horizontally, (c) determine the power loss from radiation in the energy region 0.1 <E <50keV, and (d) reconstruct the MHD fluctuation emissivity profiles from one horizontal and two vertical view using the natural rotation at frequencies up to /similar/ 100kHz.

22678 Design, fabrication, and testing of the TFTR Rogowski coil and diamagnetic loop. McCormack, B.; Thomas, J.P. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1130-1133(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The Rogowski Coil is one of the most basic and most important of the Tokamak diagnostics from a measurement and control aspect. The Diamagnetic Loop measures the change of toroidal flux caused by the presence of the plasma and the currents flowing in it; this leads to the measurement of the poloidal beta ratio. The final design resulted in stainless steel mandrels being used with the resultant diffculties of electrical insulation. The design details are presented, both mechanical and electrical, along with the details of the fabrication process.

22679 TFTR diagnostics grounding. Norris, M.E. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1134-1137(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The TFTR (Tokamak Fusion Test Reactor) now under construction at Princeton Plasma Physics Laboratory (PPPL) is scheduled to begin tune-up in 1982 with neutral beam systems operational in 1983. TFTR diagnostic systems are distributed throughout the space surrounding the Tokamak (Test Cell), and under the Tokamak in the Test Cell Basement. Both diagnostics equipment and the cable runs are subject to electromagnetic interference (EMI) from the Tokamak, high power ancillary systems, and from diagnostic-to-diagnostic crosstalk.

22680 Kinetic study of sheath region near the first wall for tokamak fusion reactors. Schwager, L.A. *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 487-490(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Theoretical profiles of density, temperature, drift velocity, and electric field are calculated for the sheath region between the plasma and first wall of a tokamak fusion reactor. It is shown that gyro-orbit effects on charged particle diffusion across the magnetic field create a sheath potential of 6 e/phi/sub k/T/sub e/ that strongly repels ions. This effect becomes important in the evaluation of sputtering and secondary electron emission at the first wall due to ion bombardment.

22681 Study of plasma edge conditions for a commercial tokamak reactor. Boley, C.D.; Brooks, J.N. (Argonne Natl Lab, IL, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 491-494(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Particle and energy fluxes to the first wall and pumped limiter of a commercial-size tokamak power reactor have been studied with a one-dimensional, time-dependent plasma transport code. The plasma is operated in an enhanced radiation mode, with iodine as the high-Z impurity, whereby the transport power to the limiter is held to about half of the alpha-heating power. Recycling of neutral hydrogen and helium is followed in detail. The ion flux to the limiter and the neutral flux to the first wall are found to depend on the removal efficiency of the limiter/vacuum system. These fluxes also depend strongly on whether gas puffing or pellet injection is used for fueling.

22682 Proposed experimental study of fast ion driven electromagnetic instabilities at low thresholds. Sutton, W.R.; Choi, C.K.; Miley, G.H. (Univ of Ill, Urbana, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 511-514(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Thermonuclear driven microinstabilities have potentially significant system level effects. experiments conducted to date, while confirming quasi-linear theory, have been performed at low densities, low temperatures and high threshold fractions. The feasibility of performing an experimental of the beam driven, fast magnetosonic mode at dramatically reduced threshold fraction (approximately 10/sup 1/5-10-/sup 4/) is demonstrated for an ISX-B plasma.

22683 Pole extraction from real-frequency information. Brittingham, J.N.; Miller, E.K.; Willows, J.L. (Lawrence Livermore Lab., CA). *Proceedings of the IEEE (Institute of Electrical and Electronics Engineers);* 68: No. 2, 263-273(Feb 19

This paper describes a procedure, analogous to Prony's method, for extracting the complex-frequency poles of electromagnetic transfer functions. The method is refined mathematically and is applied to both electrical and mechanical test cases. The paper explains a multiple processing technique, involving the overlaying of several pole sets, by which redundant data are used to separate actual from curve-fitting poles. Identification of an unknown target by comparing its scattered field with the poles sets of known targets is also illustrated for simple targets.

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REFER ALSO TO CITATION(S) 21043, 21044, 21055, 21058, 21102, 21103, 21105, 21183, 21341, 21399, 21402, 22163, 22211, 22238, 22652, 22653, 22656,

22684 (AD-A—118065/2) **One dimensional analysis of inertially confined plasmas. Master's thesis.** DeBruyne, D.A. (Air Force Inst. of Tech., Wright-Patterson AFB, OH (USA). School of Engineering). Mar 1982. 220p. NTIS, PC A10/MF A01.

Energy transfer processes in a thermonuclear plasma including Coulombic phenomena, bremsstrahlung, and Compton scatter are critically reviewed. These processes are incorporated in a three temperature, inertially confined fusion computer simulation which uses a one dimensional, spherical, Lagrangian hydrodynamics scheme. The computer code, still in the validation phase, uses separate subroutines to model hydrodynamics, thermonuclear burn, neutron heating, alpha particle heating, and energy transfer processes in CGS units.

22685 (AD-A—120052/6) **Perform experiments on LINUS-O and LTX imploding liquid liner fusion systems. Final report 8 Sep 80-30 Sep 81.** Scannell, E.P. (JAYCOR, Alexandria, VA (USA)). 27 Aug 1982. 26p. NTIS, PC A03/MF A01.

The Plasma Physics Division of the Naval Research Laboratory (NRL) has been conducting investigations of imploding liquid liner fusion systems for several years (Reference 1). This effort attained a significant milestone in 1978 with the construction of two machines: HELIUS and LINUS-O. LINUS-O is a 60 MJ rotor system where a cylindrical liquid sodium - potassium (NaK) metal liner is radially compressed from a 30 cm to 1 cm diameter by gas pressure from multiple high explosive charges. These charges act on an annular piston in contact with the liquid NaK liner material. HELIUS is a half-scale vertical axis version of LINUS-O using high pressure helium to drive the annular piston. HELIUS is designed to be a test bed for new concepts and to permit testing of new modifications to LINUS-O. The principal virtue of HELIUS is its capability for ten to twenty shots per day as compared to two or three shots per day for LINUS-O. In addition, HELIUS is designed to provide higher drive pressures than were previously obtainable with water models for liner hydrodynamic studies and a magnetic flux compression capability up to approx. 100 kG.

22686 (ANL/NESC—873) **COAST4; costing & sizing of tokamak reactors.** Sink, D.A.; Iwinski, E.M. (Westinghouse Electric Corp., Pittsburgh, PA (USA). Fusion Power Systems Dept.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048873.

Devices which can be sized and costed include: TFTR (Tokamak Fusion Test Reactor), The Next Step (TNS) devices, fusion-fission hybrids, engineering demonstration reactors, and power producing reactors. Both the ignition mode and the neutral-beam-driven mode of plasma operation are modeled. The plasma engineering calculations involve zero-dimensional models which account for energy balance, particle balance, alpha-particle effects, slowing-down theory, plasma-plasma and beam-plasma fusion reaction rates, impurity effects, and profile effects. The tokamak engineering calculations account for poloidal and toroidal magnetic field coil assemblies (both superconducting and copper conductors are possible), neutral beam injectors, blanket/shield assemblies, plasma fueling, divertors, heat dissipation systems, and related power supplies. The reactor cell containing the tokamak device, the turbine-generator plant and facility, and balance-of-plant systems are taken into account. The amount of output produced is controlled by user-specified input. The output data may consist of simply a summary table of the main plasma, engineering, and cost data, or may be expanded to include a complete set of results characterizing the plasma during burn as well as start-up; the neutral beam system; the fusile fuel system loads; blanket/shield assembly sizing; divertor parameters; poloidal field coil geometry, electrical data, self and mutual inductances, and time profiles of currents, voltages, powers, and energy utilization; toroidal field coil assembly and power supply data; heat and electrical power generation data; device radial and vertical geometry tables; detailed electrical data; component costs; annual operating costs; and a summary of the Fusion Reactor Economic Evaluation.

22687 (ANL/NESC—875) **TSOAK-M1; analysis of fusion detritiation data.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Minkoff, M. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048875.

Maximum of - 500 experimental data points.

TSOAK-M1 analyzes the reaction/adsorption/release mechanisms taking place in a large enclosure following release of large quantities of tritium. It is designed to analyze experimental tritium cleanup data in terms of these mechanisms and to perform correlations with and extensions to actual building enclosures.IBM370,303x; FORTRAN IV; OS/370; 400K bytes of memory are required.

22688 (CONF-781247—10) **Development of high-energy heavy ions for inertial-confinement fusion: a phased approach.** Martin, R.L. (Argonne National Lab., IL (USA)). 1978. Contract W-31-109-ENG-38. 13p. NTIS, PC A02/MF A01. Order Number DE83007777.

From 2. international conference on energy storage, compression and switching; Venice, Italy (5 Dec 1978).

High-energy heavy ions appear very promising as the ignition source for Inertial Confinement Fusion (ICF). As a first stage in developing the feasibility of heavy ions for this application, Argonne has designed a minimal facility capable of both demonstrating all of the accelerator techniques required in a power-plant-size facility and also of performing several physics experiments of interest to heavy-ion fusion. This design, called Phase I, would make optimal use of existing facilities made available by the termination of operation of the Zero Gradient Synchrotron (ZGS), a 12-GeV proton synchrotron for high-energy physics, in 1979. The Phase I facility would produce xenon beams of 6.4 GeV containing up to 10 kJ of beam energy at 4 TW suitable for focusing onto foils for energy-deposition experiments and studies of various beam-plasma instability experiments.

22689 (CONF-810831—100) **Materials selection for the US INTOR divertor collector plate.** Mattas, R.F.; Misra, B.; Smith, D.L.; Morgan, G.D.; Delaney, M.; Gold, R. (Argonne National Lab., IL (USA); McDonnell Douglas Astronautics Co., St. Louis, MO (USA); Westinghouse Electric Corp., Pittsburgh, PA (USA)). 1981. Contract W-31-109-ENG-38. 6p. NTIS, PC A02/MF A01. Order Number DE83007871.

From Fusion reactor materials meeting; Seattle, WA, USA (9 Aug 1981).

The divertor collector plate in the INTOR reactor will be subjected to high heat, particle, and neutron fluxes, making it the most severely damaged torus component. The collector plate is composed of a protection plate, which is directly exposed to the particle flux, and a heat sink which provides support for the protection plate and carries the water coolant. The high-Z refractory metals have been considered for use as the protection plate material, and austenitic stainless steels and copper alloys have been considered as the heat sink material. Tungsten and Type 316 stainless steels have been selected for the protection plate and heat sink, respectively. The protection plate has a sputtering lifetime of 1.75 y at a 50% duty factor, while the heat sink is expected to last the lifetime of the reactor.

22690 **(CONF-810831—101) Neutron-source characterization for fusion-materials studies.** Greenwood, L.R. (Argonne National Lab., IL (USA)). Jun 1981. Contract W-31-109-ENG-38. 6p. NTIS, PC A02/MF A01. Order Number DE83007829.

From Fusion reactor materials meeting; Seattle, WA, USA (9 Aug 1981).

Neutron-flux and energy-spectrum measurements are conducted for all major fusion-materials irradiation facilities, including fission reactors and accelerators. Dosimetry-characterization experiments and integral cross section measurements have been performed. Multiple activation and helium-production measurements are performed routinely to provide materials experimenters with neutron-exposure parameters including fluence, spectrum, displacements, gas production, and transmutation with typical accuracies of 10 to 15%. Such data are crucial to the fusion-materials program in order to correlate materials-property changes between irradiations and facilities and to confidently predict the performance of materials in fusion reactors.

22691 **(CONF-811040—190) Redeposition of the sputtered surface in limiters.** Brooks, J.N.; McGrath, R.T. (Argonne National Lab., IL (USA); Pennsylvania State Univ., University Park (USA)). 1981. Contract W-31-109-ENG-38. 5p. NTIS, PC A02/MF A01. Order Number DE83007756.

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Erosion of the surface coating of a pumped limiter by sputtering may be a critical life-limiting issue for future tokamak reactors. Redeposition of the sputtered material, however, may extend the coating life significantly. This subject has now been studied through the use of a code which models the redeposition of sputtered material which gets ionized in the scrape-off layer. The code also treats the transfer of wall-sputtered material to the limiter. The code uses models of the plasma density and temperature in the scrape-off zone, sheath potential, sputtering coefficients, spatial distribution of the sputtered atoms, and electron impact ionization coefficient for the sputtered atoms. The studies were made for high flux and low flux edge conditions corresponding to FED and STARFIRE limiters and assumed plasma-edge parameters. The results indicate that substantial redeposition from the scrape-off layer ionized neutrals occurs in the cases considered.

22692 **(CONF-811040—191) INTOR radiation shielding for personnel access.** Gohar, Y.; Abdou, M. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 5p. NTIS (US Sales Only). Order Number DE83007698.

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The INTOR reactor shield system consists of the blanket, bulk shield, penetration shield, component shield, and biological shield. The bulk shield consists of two parts: (a) the inboard shield; and (b) the outboard shield. The distinction between the different components of the shield system is essential to satisfy the different design constraints and achieve various objectives.

22693 **(CONF-811040—193) Self-sustaining erosion-resistant low-Z coatings for first wall and limiter applications. I. Theory.** Krauss, A.R.; Gruen, D.M.; DeWald, A.B. (Argonne National Lab., IL (USA); Georgia Inst. of Tech., Atlanta (USA)). 1981. Contract W-31-109-ENG-38. 5p. NTIS, PC A02/MF A01. Order Number DE83007701.

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

It has been suggested that dilute alkali-metal alloys at surface facing a Tokamak plasma might be used to provide a self-sustaining low-Z alkali-metal surface which would shield the structural component of the alloy from erosion. At the same time, the alkali-metal overlayer could be expected to primarily sputter as secondary ions, which are returned to the wall and limiter without entering the plasma. In order to achieve this goal, a number of conditions which may be mutually exclusive must be met. Several of these conditions are analyzed, providing information on the feasibility and expected limits of performance for dilute alloys of Li in Al, Si, and Cu.

22694 **(CONF-811040—195) Physical sputtering code for fusion applications.** Smith, D.L.; Brooks, J.N.; Post, D.E. (Argonne National Lab., IL (USA); Princeton Univ., NJ (USA). Plasma Physics Lab.). Oct 1981. Contract W-31-109-ENG-38. 5p. NTIS, PC A02/MF A01. Order Number DE83007700.

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A computer code, DSPUT, has been developed to compute the physical sputtering yields for various plasma particles incident on candidate fusion-reactor first-wall materials. The code, which incorporates the energy and angular-dependence of the sputtering yield, treats both high- and low-Z incident particles bombarding high- and low-Z wall materials. The physical sputtering yield is expressed in terms of the atomic and mass numbers of the incident and target atoms, the surface binding energy of the wall materials, and the incident angle and energy of the particle. An auxiliary code has been written to provide sputtering yields for a Maxwellian-averaged incident particle flux. The code DSPUT has been used as part of a Monte Carlo code for analyzing plasma-wall interactions.

22695 **(CONF-811040—196) Can wall and limiter erosion be eliminated in fusion reactors.** Norem, J.H. (Argonne National Lab., IL (USA)). Oct 1981. Contract W-31-109-ENG-38. 4p. NTIS, PC A02/MF A01. Order Number DE83007695.

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

A pump limiter system is described which is compatible with in-situ recoating of the limiter surface. The recoating could be done during normal tokamak operation. We have shown how this system is compatible with most of the constraints of fusion reactor operation and might provide a significant advantage over magnetic diverter and some other pump limiter geometries.

22696 **(CONF-811040—197) Initial progress in the first wall, blanket, and shield Engineering Test Program for magnetically confined fusion-power reactors.** Herman, H.; Baker, C.C.; Maroni, V.A. (Argonne National Lab., IL (USA)). Oct 1981. Contract W-31-109-ENG-38. 5p. NTIS, PC A02/MF A01. Order Number DE83007790.

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The first wall/blanket/shield (FW/B/S) Engineering Test Program (ETP) progressed from the planning stage into implementation during July, 1981. The program, generic in nature, comprises four Test Program Elements (TPE's), the emphasis of which is on defining the performance parameters for the Fusion Engineering Device (FED) and the major fusion device to follow FED. These elements are: (1) nonnuclear thermal-hydraulic and thermomechanical testing of first wall and component facsimiles with emphasis on surface heat loads and heat transient (i.e., plasma disruption) effects; (2) nonnuclear and nuclear testing of FW/B/S components and assemblies with emphasis on bulk (nuclear) heating effects, integrated FW/B/S hydraulics and mechanics, blanket coolant system transients, and nuclear benchmarks; (3) FW/B/S electromagnetic and eddy current effects testing, including pulsed field penetration, torque and force restraint, electromagnetic materials, liquid metal MHD effects and the like; and (4) FW/B/S Assembly, Maintenance & Repair (AMR) studies focusing on generic AMR criteria, with the objective of preparing an AMR designers guidebook; also, development of rapid remote assembly/disassembly joint system technology, leak detection and remote handling methods.

22697 **(CONF-811046—19) First-wall and blanket engineering development for magnetic-fusion reactors.** Baker, C.; Herman, H.; Maroni, V.; Turner, L.; Clemmer, R.; Finn, P.; Johnson, C.; Abdou, M. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 28p. NTIS, PC A03/MF A01. Order Number DE83007643.

From Meeting and workshop on fusion reactor design and technology; Tokyo, Japan (5 Oct 1981).

A number of programs in the USA concerned with materials and engineering development of the first wall and breeder blanket systems for magnetic-fusion power reactors are described. Argonne National Laboratory has the lead or coordinating role, with many major elements of the research and engineering tests carried out by a number of organizations including industry and other national laboratories.

22698 (CONF-811274—1) **Charge, quantum state, and energy distributions of impurities released in plasma-wall interaction processes.** Gruen, D.M. (Argonne National Lab., IL (USA)). 1981. Contract W-31-109-ENG-38. 7p. NTIS, PC A02/MF A01. Order Number DE83007758.

From Institute of Plasma Physics conference; Nogoya, Japan (14 Dec 1981).

Conventional wisdom has it that total sputtering yields correlate with high Z-impurity levels found in fusion plasmas. The charge, quantum states and energy distributions of sputtered atoms have been virtually ignored in these considerations. Impurity transport from the wall or limiter to the plasma is, however, strongly influenced by these factors which may play a crucial role in determining impurity levels in the deeper plasma regions. Preliminary calculations have shown that positively charged impurities would most likely be redeposited on their surfaces of origin. The conditions leading to charged or excited state atoms emission and the energy distributions of such species are reviewed. Techniques for measuring these quantities are discussed and the need for a wider data base in this field is pointed out.

22699 (CONF-820545—22) **Oxygen and titanium sputtering yields as determined by laser fluorescence and Auger electron spectroscopy for monolayer oxygen coverage of polycrystalline Ti.** Pellin, M.J.; Young, C.E.; Mendelsohn, M.H.; Gruen, D.M.; Wright, R.B.; DeWald, A.B. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 22p. NTIS, PC A02/MF A01. Order Number DE83007683.

From 5. international conference on plasma surface; Gatlinburg, TN, USA (3 May 1982).

The presence of an oxide layer can strongly influence the charge-state of species ejected from ion-bombarded metal surfaces, as well as the total sputtering yield. These quantities directly affect the influx of metallic impurities from the wall region into the plasmas of fusion devices. Surface coverage can also modify the distribution of sputtered atoms among electronic states and thus the apparent impurity density detected by the laser fluorescence spectroscopy (LFS) technique. The measurements reported here provide LFS data on number density and electronic state populations for the species Ti and Ti^+ as a function of surface oxygen coverage in a laboratory apparatus providing for direct monitoring by Auger analysis.

22700 (CONF-820838—3) **Review of commercial tokamak fusion-reactor conceptual design studies.** Baker, C.C.; Conn, R.W. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 42p. NTIS, PC A03/MF A01. Order Number DE83007569.

From Future engineering development needs for magnetic fusion workshop; Washington, DC, USA (3 Aug 1982).

A summary of the design developments for tokamaks is given. In general, these design developments have emphasized less complex, more reliable components and systems. Several of these developments are applicable to other reactor concepts (e.g., nondivertor impurity control, rf heating, maintenance concepts, and simplified energy conversion systems. Some of these ideas are reasonably well supported by current experiments and theory (e.g., projected size of tokamaks for ignition) while some of the other concepts (e.g., non-divertor impurity control, steady-state operation, solid tritium breeders) require much more research and development.

22701 (CONF-821108—25) **Safety and stability of superconducting magnets for fusion using internally cooled conductors.** Turner, L.R.; Ryne, R.D. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 4p. NTIS, PC A02/MF A01. Order Number DE83007728.

From Applied superconductivity conference; Knoxville, TN, USA (30 Nov 1982).

Vincent Arp's computer code for the stability analysis of internally cooled conductors (ICC) has been combined with ANL's TASS code to create the code SSICC for the analysis of the safety and stability of ICC. The code has been tested against the ICC experiments of Lue, Miller, and Dresner, and applied to the FED TF coil conductor.

22702 (CONF-830406—3) **Tritium-assisted deuterium-based fusion breeders.** Greenspan, E.; Miley, G.H. (Illinois Univ., Urbana (USA). Fusion Studies Lab.). 1983. Contract AC02-76ET52040. 2p. (COO—2218-268). NTIS, PC A02/MF A01. Order Number DE83005315.

From 5. topical meeting on technology of fusion energy; Knoxville, TN, USA (26 Apr 1983).

This study investigates the economic prospects of T-assisted D-based Fusion Breeders (FB's) in comparison with a conventional D-T FB.The D-based driver uses the Tritium-Catalyzed-Deuterium (TCD) mode of operation where the ^3He leaking out from the plasma is converted into T in the blanket (by neutron capture). The T produced is then added back to the plasma. TCD operation is selected because it offers a significantly higher neutron yield and support-ratio than the standard Catalyzed-D. It offers also higher neutron yield and better plasma energy balance than the standard Semi-Catalyzed-D mode.

22703 (DOE/DP/40166—1) **Wavelength scaling of the two-plasmon decay and stimulated Raman-scattering instabilities. Annual progress report, September 10, 1981-September 9, 1982.** Chen, F.F.; Joshi, C.; Ebrahim, N.A. (California Univ., Los Angeles (USA). Dept. of Electrical Engineering; Yale Univ., New Haven, CT (USA). Dept. of Applied Mechanics). Mar 1983. Contract AS08-81DP40166. 24p. NTIS, PC A02/MF A01. Order Number DE83007905.

This report contains description of the joint work done by the UCLA-Yale Users' Group at NLUF, LLE Rochester on the two plasmon decay and stimulated Raman scattering instabilities at 0.35 μm laser wavelength. A brief summary of the theoretical work on how SBS influences SRS is also given.

22704 (DOE/ER—0045/9) **Alloy development for irradiation performance. Semiannual progress report for period ending September 30, 1982.** (Oak Ridge National Lab., TN (USA)). Feb 1983. Contract W-7405-ENG-26. 345p. NTIS, PC A15/MF A01. Order Number DE83006357.

Separate abstracts were prepared for 19 of the included sections. (MOW)

22705 (DOE/ER—0045/9, pp 6-16) **Neutron source characterization for materials experiments.** Greenwood, L.R. (Argonne National Lab., IL). Feb 1983. NTIS, PC A15/MF A01.

In Alloy development for irradiation performance. Semiannual progress report for period ending September 30, 1982.

Measurements and calculations are presented for the ORR-MFE4A spectral-tailoring experiment after an irradiation of 406 full power days (30 MW) between June 12, 1980 and April 26, 1982. The maximum fluence inside the capsule was 1.76 x 10^{22} n/cm^2 producing 4.67 DPA and 63 appm He in stainless steel (13%) Ni). Values outside the sample holders were 1.88 x 10^{22} n/cm^2, 4.94 DPA and 73 appm He in stainless steel. Helium calculations include epithermal effects and the extra displacements from the energetic ^{56}Fe recoils.

22706 (DOE/ER—0045/9, pp 21-31) **HFIR/FFTF irradiation experiment: final design phase.** Ermi, A.M.; Greenslade, D.L.; Vitek, J.M. Feb 1983. NTIS, PC A15/MF A01.

In Alloy development for irradiation performance. Semiannual progress report for period ending September 30, 1982.

The combined HFIR/FFTF experiment on the Path A Prime Candidate Alloy and the Path D Long-Range Ordered Alloys is in the final design stage. A sodium-filled test assembly to be used for the HFIR irradiation has been designed, the main features of which are described. The updated proposed test matrix is also presented.

22707 (DOE/ER—0045/9, pp 38-43) **Irradiation creep in path A alloys irradiated to 5 dpa in the ORR-MFE-4A spectral tailoring experiment.** Grossbeck, M.L. (Oak Ridge National Lab., TN). Feb 1983. NTIS, PC A15/MF A01.

In Alloy development for irradiation performance. Semiannual progress report for period ending September 30, 1982.

Pressurized tubes have been irradiated to 4.8 dpa at 330 and 400°C in the ORR-MFE-4A spectral tailoring experiment. At 330°C, 20%-cold-worked type 316 stainless steel (CW 316) and path A PCA demonstrated irradiation creep similar to predictions of the irradiation creep equation developed in the Fast Breeder Reactor Program. The creep rate for path A PCA was approximately 25% higher than that of type 316 stainless steel.

22708 (DOE/ER—0045/9, pp 44-62) **Swelling and microstructural development in path A PCA and type 316 stainless steel irradiated in HFIR to about 22 dpa.** Maziasz, P.J.; Braski, D.N. (Oak Ridge National Lab., TN). Feb 1983. NTIS, PC A15/MF A01.

In Alloy development for irradiation performance. Semiannual progress report for period ending September 30, 1982.

Irradiation of several microstructural variants of PCA and 20%-cold-worked N-lot type 316 stainess steel (CW 316) in HFIR to about 10 dpa produced no visible cavities at 300°C, bubbles at 400°C, and varying distributions of bubbles and voids at 500 and 600°C. The PCA-B1 swells the most and CW 316 (N-lot) the least at 600°C. Irradiations have been extended to about 22 dpa. The PCA-Al swells 0.06%/dpa at 600°C but at a much lower rate at 500°C. The PCA-A3 shows the lowest swelling at 600°C, about the half the swelling rate of type 316 stainless steel.

22709 (DOE/ER—0045/9, pp 63-70) **Tensile properties of unirradiated path A PCA.** Braski, D.N.; Maziasz, P.J. (Oak Ridge National Lab., TN). Feb 1983. NTIS, PC A15/MF A01.

In Alloy development for irradiation performance. Semiannual progress report for period ending September 30, 1982.

The tensile properties of PCA in the Al (solution annealed), A3 (25%-cold worked), and B2 (aged, cold worked, and reaged) conditions were determined from room temperature to 600°C. The tensile behavior of PCA-A1 and -A3 was generally similar to that of titanium-modified type 316 stainless steel with similar microstructures. The PCA-B2 was weaker than PCA-A3, especially above 500°C, but demonstrated slightly better ducility.

22710 (DOE/ER—0045/9, pp 71-77) **Tensile properties and swelling of 20%-cold-worked type 316 stainless steel irradiated in HFIR.** Klueh, R.L.; Grossbeck, M.L. (Oak Ridge National Lab., TN). Feb 1983. NTIS, PC A15/MF A01.

In Alloy development for irradiation performance. Semiannual progress report for period ending September 30, 1982.

Immersion density and elevated-temperature tensile properties were determined on 20%-cold-worked type 316 stainless steel irradiated in the HFIR to fluences of 3.5 to 6.3 x 10^{26} neutrons/m^2 (>0.1 MeV), which resulted in 25 to 49 dpa and 1650 to 3100 at. ppM He. These data were combined with the data previously obtained after irradiation to lower fluences (<4.0 x 10^{26} neutrons/m^2).

22711 (DOE/ER—0045/9, pp 78-88) **Microstructural development of 20%-cold-worked type 316 stainless steel irradiated in ORR at 250 to 500°C.** Maziasz, P.J. (Oak Ridge National Lab., TN). Feb 1983. NTIS, PC A15/MF A01.

In Alloy development for irradiation performance. Semiannual progress report for period ending September 30, 1982.

No voids, bubbles, or precipitation are observed in 20%-cold-worked (ref.-heat) type 316 stainless steel irradiated in ORR at 250 to 500°C to produce 5 dpa and 38.7 at. ppM He. There is some recovery of the cold-worked structure at 500°C, but not at 250 to 450°C. The total dislocation structure is quite dense from 250 to 450°C due to the presence of many Frank loops and a high concentration of fine loops (black dots). No significant effect of helium could be determined, but bubble formation appears retarded in ORR compared with that in HFIR.

22712 (DOE/ER—0045/9, pp 90-120) **Ductility behavior of irradiated path B alloys.** Yang, W.J.S.; Hamilton, M.L. (Westinghouse Hanford Co., Richland, WA). Feb 1983. NTIS, PC A15/MF A01.

In Alloy development for irradiation performance. Semiannual progress report for period ending September 30, 1982.

The objective of this study was to assess the practicality of using five Path B alloys in their current form as structural materials in the Fusion First-Wall/Blanket by evaluating both their postirradiation ductility and the corresponding microstructures.

22713 (DOE/ER—0045/9, pp 122-142) **Mechanical property evaluations of path C vanadium scoping alloys.** Gold, R.E.; Bajaj, R. Feb 1983. NTIS, PC A15/MF A01.

In Alloy development for irradiation performance. Semiannual progress report for period ending September 30, 1982.

Creep/stress-rupture tests were performed on sheet specimens of the three Path C vanadium Scoping Alloys in the temperature range 650 to 800°C. These specimens had been intentionally contaminated with nominal additions of 600 and 1200 wppm oxygen by controlled gas-metal reactions. The effects of oxygen additions on the creep behavior of the vanadium alloys, over the limited range of stress-temperature conditions examined, did not appear to be significant. Creep strengths and ductilities appeared to be affected very little compared to tests at similar conditions on noncontaminated specimens of the vanadium alloys. These results are different in that regard from similar comparisons of tensile properties of contaminated and noncontaminated vanadium alloy specimens where a partial change in the fracture behavior was observed for the oxygen-contaminated specimens.

22714 (DOE/ER—0045/9, pp 144-157) **Microstructure of welds in an iron-base long-range-ordered alloy.** Braski, D.N.; David, S.A. (Oak Ridge National Lab., TN). Feb 1983. NTIS, PC A15/MF A01.

In Alloy development for irradiation performance. Semiannual progress report for period ending September 30, 1982.

The microstructure of gas tungsten arc (GTA) welds of a $(Ni,Fe)_3(V,Ti)$ LRO alloy has been investigated. Crack-free welds were produced in which the heat-affected zone (HAZ) and fusion zone were disordered and softened. A postweld heat treatment increased the hardness of both zones by reordering the structure and produced additional hardening in the fusion zone due to precipitation of small VC particles on grain boundaries and matrix dislocations.

22715 (DOE/ER—0045/9, pp 178-219) **Fractographic examination of HT-9 and 9Cr-1Mo Charpy specimens irradiated in the AD-2 test.** Gelles, D.S.; Hu, W.L. (Westinghouse Hanford Co., Richland, WA). Feb 1983. NTIS, PC A15/MF A01.

In Alloy development for irradiation performance. Semiannual progress report for period ending September 30, 1982.

Fracture surface topologies have been examined using scanning electron microscopy for 20 selected half sized Charpy impact specimens of HT-9 and Modified 9Cr-1Mo in order to provide improved understanding of fracture toughness degradation as a result of irradiation for Path E alloys. The specimen matrix included unirradiated specimens and specimens irradiated in EBR-II in the AD-2 experiment. Also, hardness measurements have been made on selected irradiated Charpy specimens. The results of examinations indicate that irradiation hardening due to G-phase formation at 390°C is responsible for the large shift in ductile-to-brittle transition temperature (DBTT) found in HT-9. Toughness degradation in HT-9 observed following higher temperature irradiations is attributed to precipitation at delta ferrite stringers. Reductions in toughness as a consequence of irradiation in Modified 9Cr-1Mo are attributed to in-reactor precipitation of (V,Nb)C and $M_{23}C_6$. It is shown that crack propagation rates for ductile and brittle failure modes can be measured, that they differ by over an order of magnitude and that unexpected multiple shifts in fracture mode from ductile to brittle failure can be attributed to the effect of delta ferrite stringers on crack propagation rates.

22716 (DOE/ER—0045/9, pp 221-229) **Fracture toughness of unirradiated HT-9 and modified 9Cr-1Mo welds.** Huang, F.H. (Westinghouse Hanford Co., Richland, WA). Feb 1983. NTIS, PC A15/MF A01.

In Alloy development for irradiation performance. Semiannual progress report for period ending September 30, 1982.

The fracture toughness of HT-9 weld metal, HT-9 HAZ and modified 9Cr-1Mo weld metal was measured using electropotential techniques. Circular (2.54 mm thick) compact tension specimens were fabricated from welded materials with the notch orientation parallel to the fusion line. Tests were performed at 93, 205, 427 and 538°C. The test results were analyzing using the J-integral approach. It was found that the fracture toughness of HT-9 and modified 9Cr-1Mo was not significantly reduced due to welding.

22717 (DOE/ER—0045/9, pp 231-243) **Effect of melt practice (ESR vs. AOD) on the toughness of HT-9 laser welds.** Lippold, J.C. (Sandia National Labs., Livermore, CA). Feb 1983. NTIS, PC A15/MF A01.

In Alloy development for irradiation performance. Semiannual progress report for period ending September 30, 1982.

The toughness behavior of laser welded AOD- and ESR-processed material from the National Fusion Heat was evaluated. In general, the fusion zone toughness was equivalent, if not superior, to that of the base metal. The microstructural refinement which results from weld solidification is probably responsible for the improvement in properties. The chemical inhomogeneity due to paritioning during solidification is probably responsible for the improvement in properties. The chemical inhomogeneity due to partitioning during solidification appears to exert only a small effect on the properties. The fracture mode is analogous to that of the base material; lower shelf failure exhibits a cleavage mode while upper shelf failure occurs by ductile rupture.

22718 (DOE/ER—0045/9, pp 244-251) **Effect of quench rate and refrigeration on the mechanical properties of ESR processed HT-9.** Garrison, W.M. Jr.; Hyzak, J.M. (Sandia National Labs., Livermore, CA). Feb 1983. NTIS, PC A15/MF A01.

In Alloy development for irradiation performance. Semiannual progress report for period ending September 30, 1982.

HT-9 contains about 9 volume percent retained austenite when air cooled after austenitizing. To reduce the retained austenite content of HT-9 from that of the air cooled (AC) condition, two other treatments after austenitizing were employed: oil quenching (OQ) and oil quenching followed by refrigeration in liquid nitrogen (OQLN). The OQ structure contained 6% retained austenite and the OQLN structure had only 4% retained austenite. Preliminary Charpy impact data indicate some beneficial effect of these treatments. The Charpy impact values of specimens tempered at 750°C were 78, 80 and 97 ft-lbs for the AC, OQ and OQLN structures respectively.

22719 (DOE/ER—0045/9, pp 255-272) **Miniature Charpy impact test results for irradiated ferritic alloys.** Hu, W.L. (Westinghouse Hanford Co., Richland, WA). Feb 1983. NTIS, PC A15/MF A01.

In Alloy development for irradiation performance. Semiannual progress report for period ending September 30, 1982.

Impact tests of irradiatd Charpy specimens made of ferritic alloys were conducted at temperatures from -65° to 250°C. The specimens involve four different material stocks, namely, HT-9 base metal, HT-9 weld metal, HT-9 heat-affected-zone (HAZ) and modified 9Cr-1Mo base metal. The specimens were irradiated in EBR-II to a peak exposure of approximately 13 dpa at temperatures of 390, 450, 500 and 550°C. Specimens made of unirradiated HT-9 base metal and modified 9Cr-1Mo base metal were also tested.

22720 (DOE/ER—0045/9, pp 290-303) **Corrosion of path A PCA, type 316 stainless steel and Fe-12 Cr-1 MoVW steel in flowing lithium.** Tortorelli, P.F.; DeVan, J.H. (Oak Ridge National Lab., TN). Feb 1983. NTIS, PC A15/MF A01.

In Alloy development for irradiation performance. Semiannual progress report for period ending September 30, 1982.

Results from lithium thermal-convection loop (TCL) experiments with the path A prime candidate alloy (PCA), type 316 stainless steel, and Fe-12 Cr-1 MoVW are presented. The short-term (< 3050 h) weight losses of PCA in flowing lithium were just slightly higher than those of type 316 stainless steel and may be attributable to the higher nickel concentration of PCA. The corrosion response of PCA specimens was not affected by cold work. A surface analysis of type 316 stainless steel specimens exposed in the hot leg of a TCL for over 7000 h confirmed earlier observations regarding preferential leaching of nickel and chromium and deposition of pure chromium. These analyses also showed that exposure temperature strongly affects surface porosity and that molybdenum enrichment occurs on surfaces undergoing dissolution. Weight loss data as a function of time for Fe-12 Cr-1 MoVW steel exposed to lithium at 500°C yielded the same dissolution rate as the steady-state value for nickel-depleted type 316 stainless steel. Significant weight losses were measured in the cold leg of this loop, and they appeared to be related to chromium depletion (possibly as a result of impurity reactions).

22721 (DOE/ER—0045/9, pp 304-313) **Environmental effects on properties of structural alloys.** Chopra, O.K.; Smith, D.L. Feb 1983. NTIS, PC A15/MF A01.

In Alloy development for irradiation performance. Semiannual progress report for period ending September 30, 1982.

Compatibility tests were conducted with several ferritic and austenitic steels at 700 and 755 K to study the corrosion behavior in flowing lithium, and fatigue tests were performed with Type 316 stainless steel in lithium at 755 K. The results indicate that an increase in the nitrogen content in lithium increases the dissolution rate, whereas the depth of internal penetration is not affected significantly. The dissolution rate of ferritic steels is an order of magnitude lower than for the austenitic stainless steel. The austenitic steels develop a very porous ferrite layer, whereas the ferritic steels exhibit little or no penetration. For the austenitic stainless steels, depth of internal penetration increases with time and the penetration rates at 755 K range from 50 to 180 μm/year. Preliminary data on Type 316 stainless steel yield similar penetration rates at 700 and 755 K. The fatigue life of annealed Type 316 stainless steel in lithium at 755 K is a factor of 3 to 8 greater than in air.

22722 (DOE/ER—0045/9, pp 314-322) **Corrosion of ferrous alloys in static Pb and Pb-17 at. % Li.** Tortorelli, P.F.; DeVan, J.H. (Oak Ridge National Lab., TN). Feb 1983. NTIS, PC A15/MF A01.

In Alloy development for irradiation performance. Semiannual progress report for period ending September 30, 1982.

Specimens of type 316 stainless steel were exposed to static pure lead for 1000 and 3000 h at 400, 500, and 600°C, respectively. Weight losses measured in these tests were compared with those measured in similar tests with Pb-17 at. % Li. The data showed that the addition of 17 at. % Li to lead has some effect on its dissolution behavior relative to type 316 stainless steel; however, the weight losses in both the lead-lithium and pure lead melts were much larger than in pure lithium. Preliminary results from compositional analyses of type 316 stainless steel exposed to static Pb-17 at. % Li showed surface depletion of nickel at 500°C.

22723 (DOE/ER—0045/9, pp 323-338) **Compatibility studies of structural alloys with solid breeder materials.** Chopra, O.K.; Smith, D.L. (Argonne National Lab., IL). Feb 1983. NTIS, PC A15/MF A01.

In Alloy development for irradiation performance. Semiannual progress report for period ending September 30, 1982.

The compatibility of ferritic and austenitic steels with Li_2O pellets has been investigated at 823 K (550°C) in flowing helium containing 93 ppM H_2O and 1 ppM H_2. The results indicate that both steels develop an iron-rich outer scale and a chromium-rich subscale. The reaction rates for ferritic and austenitic steels are comparable and yield a value of ~ 85 μm/year for penetration rate. The Li_2O pellets exposed with the various alloys lose weight. The weight loss follows a parabolic law, predicting a value of ~ 4.8%/year.

22724 **(DOE/ET/52040—T7) Effects of nuclear elastic scattering and modifications of ion-electron equilibration power on advanced-fuel burns.** Galambos, J.D. (Illinois Univ., Urbana (USA). Dept. of Nuclear Engineering). 1983. Contract AC02-76ET52040. 126p. (COO—2218-258). NTIS, PC A07/MF A01. Order Number DE83007190.

The effects of Nuclear Elastic Scattering (NES) of fusion products and modifications of the ion-electron equilibration power on D-T and D-based advanced-fuel fusion plasmas are presented. The processes causing the modifications to the equilibration power included here are: (1) depletion of low-energy electrons by Coulomb collisions with the ions, and (2) magnetic field effects on the energy transfer between the ions and the electrons. A Hot Ion Mode (HIM) analysis was used to investigate the changes in the minimum ignition requirements for Cat-D and D-^{3}He plasmas, due to the changes in the allowable T/sub i//T/sub e/ for ignition from NES and equilibration modifications. Both of these effects have the strongest influence on the ignition requirements for high temperature (>50 keV), low beta (<15%) plasmas, where the cyclotron radiation power loss from the electrons (which is particularly sensitive to changes in the electron temperature) is large.

22725 **(EGG-FT—6138) Ohmically heated toroidal experiment (OHTE) mobile ignition test reactor facility concept study.** Masson, L.S.; Watts, K.D.; Piscitella, R.R.; Sekot, J.P.; Drexler, R.L. (EG and G Idaho, Inc., Idaho Falls (USA)). Feb 1983. Contract AC07-76ID01570. 49p. NTIS, PC A02/MF A01. Order Number DE83008006.

This report presents the results of a study to evaluate the use of an existing nuclear test complex at the Idaho National Engineering Laboratory (INEL) for the assembly, testing, and remote maintenance of the ohmically heated toroidal experiment (OHTE) compact reactor. The portable reactor concept is described and its application to OHTE testing and maintenance requirements is developed. Pertinent INEL facilities are described and several test system configurations that apply to these facilities are developed and evaluated.

22726 **(GA-A—16818) Data-acquisition systems for the present and the future.** Drobnis, D.D. (GA Technologies, Inc., San Diego, CA (USA)). Sep 1982. Contract AT03-76ET51011. 50p. (CONF-820944—7). NTIS, PC A03/MF A01. Order Number DE83007186.

From Workshop on diagnostics for fusion reactor conditions; Varenna, Italy (6 Sep 1982).

Basic components of today's acquisition systems are surveyed. These include front-end tools such as microprocessors, programmable controllers, and CAMAC interfaces. Some key concepts in large central real-time systems are examined: Hardware and Software architecture, and data base structure. Some trends in present data acquisition system design are analyzed, including increasing distribution of system functions and expansion to hierarchical multiprocessor netowrks. With the evolution of microprocessors, front-end intelligence is growing into front-end computing power. Real-time host systems are becoming increasingly sophisticated human interface and data base management tools, with increasingly complex operating systems, and increasing amounts of memory, mass storage, and computing power. And the ultimate analysis of plasma data is becoming increasingly sophisticated.

22727 **(HEDL-TME—82-9) Review of active neutron-spectrometry methods for the energy range of 1 to 50 MeV.** Fuller, J.L. (Hanford Engineering Development Lab., Richland, WA (USA)). Jan 1983. Contract AC06-76FF02170. 84p. NTIS, PC A05/MF A01. Order Number DE83008078.

In support of the Fusion Materials Irradiation Test (FMIT) Facility, active neutron spectrometry methods for the energy range 1 to 50 MeV are reviewed from reports in the literature. The general operating characteristics of each type of spectrometer are summarized and conclusions drawn concerning applicability to the FMIT. The most useful system are: (1) liquid organic scintillators and (2) short path time-of-flight (TOF) telescopes. A magnetic spectrometer systems also is worthy of consideration.

22728 (INIS-SU—110, pp B-4) **Exact analytical force-free three-dimensional toroidal equilibria of arbitrary cross section.** Ferdinand, F.C. (Innsbruck Univ. (Austria)). 1981. NTIS (US Sales Only).

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

22729 (INIS-SU—110, pp B-16) **Numerical simulation of the plasma column behaviour in the equilibrium control system operation in a tokamak with a high field and adiabatic compression.** Gribov, Yu.V.; Chuyanov, V.A. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Atomnoj Ehnergii:; Mitrishkin, Yu.V.; Fitsner, L.N. (Inst. of Control Sciences, Moscow (USSR)). 1981. NTIS (US Sales Only).

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

22730 (INIS-SU—110, pp F-2b) **Interaction of the intense focused REB with dense plasma.** Chichkin, R.V.; Gorbulin, Yu.M.; Kalinin, Yu.G.; Markov, Yu.A.; Shashkov, A.Yu.; Skoryupin, V.A.; Zlotnikov, D.M. 1981. NTIS (US Sales Only).

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

22731 (INIS-SU—110, pp G-6) **Modelling of start-up in the INTOR.** Abramov, V.A.; Dnestrovskij, Yu.N.; Krotova, G.I.; Kukushkin, A.S.; Lysenko, S.E.; Pereverzev, G.V.; Pogutse, O.P.; Tarasyan, K.N. 1981. NTIS (US Sales Only).

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

22732 (INIS-SU—110, pp G-13) **Parametric analysis of power plant based on laser fusion.** Kalmikov, Yu.K.; Komin, A.V.; Krivosheev, M.V. (Nauchno-Issledovatel'skij Fiziko-Khimicheskij Inst., Moscow (USSR)); Rozanov, V.B. (AN SSSR, Moscow. Fizicheskij Inst.). 1981. NTIS (US Sales Only).

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

22733 (INIS-SU—110, pp H-20) **Production of negative deuterium ion beams by means of negative surface ionization.** Massmann, P.; Bonmel, P.J.; Granneman, E.H.A.; Hopman, H.J.; Los, J.; Siebenlist, F.; Wunnik, J.N.M. (FOM-Instituut voor Atoom-en Molecuulfysica, Amsterdam (Netherlands)). 1981. NTIS (US Sales Only).

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

22734 (INIS-SU—110, pp J-1) **Suppression of impurity influx, remote radiative cooling and helium ash compression with poloidal divertor in Doublet 3.** Shimada, M.; Ioki, K.; Nagami, M.; Yokomizo, H.; Izumi, S.; Maeno, M.; Shinya, K.; Yoshida, H.; Kitsunezaki, A. (Japan Atomic Energy Research Inst., Tokyo:; Brooks, N. (General Atomic Co., San Diego, CA (USA)). 1981. NTIS (US Sales Only).

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

22735 (INIS-SU—110, pp J-12) **Analysis of graphite limiter after operation in T-10.** Hildebrandt, D.; Laux, M.; Lingertat, J.; Pech, P.; Reiner, H.-D.; Strusny, H.; Wolff, H. (Akademie der Wissenschaften der DDR, Berlin. Zentralinstitut fuer Elektronenphysik:. 1981. NTIS (US Sales Only).

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

22736 **(IPP—2/259) Vacuum magnetic field and modular coil system of the advanced stellarator Wendelstein VII-AS.** Rau, F.; Kisslinger, J.; Wobig, H. (Max-Planck-Institut fuer Plasmaphysik, Garching (Germany, F.R.)). Jun 1982. 44p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83750190.

The vacuum field and the modular coils of the advanced stellarator WENDELSTEIN VII-AS are described. Each of the five field periods contains 9 different twisted coils, one of them with increased dimensions and current in order to provide sufficient access. The standard vacuum field configuration (B=3 T, t=0.39, aspect ratio approx. equal to 10, low shear, and magnetic well) can be varied by toroidal and vertical fields, or by changing independently the current in the large special coils. From a study of magnetic field perturbations some estimates are derived for the admissible coil tolerances.

22737 **(IPPJ—551) Workshop on first wall coating.** Kamada, K.; Fukutomi, M. (Nagoya Univ. (Japan)). Mar 1982. 230p. NTIS, PC A11/MF A01.

REFS Workshop held at Nagoya, Japan, 28-29 Nov. 1980.

Impurity control and first wall design in the JT 60 long pulse Tokamak is discussed. The present state of coating technology in Japan is reviewed with emphasis on fabrication methods and the characterization of thin coated films available by plasma spraying and chemical and physical vapor deposition. Surface preparation, radiation damage, internal stress, crystal structure and bonding are considered as well as the application of silicon carbide, titanium nitride, titanium carbide, titanium boride, and chromium nitride coatings by magnetron sputtering, long plating, electron beam evaporation, and gas absorption and reactive r.f. sputtering.

22738 (LA—9629-PR) **Transport and reactor theory. Progress report, July 1-September 30, 1982.** O'Dell, R.D.; Alcouffe, R.E. (Los Alamos National Lab., NM (USA)). Jan 1983. Contract W-7405-ENG-36. 28p. NTIS, PC A03/MF A01. Order Number DE83008276.

Research and development progress in transport and reactor theory by the Los Alamos National Laboratory's Group T-1 for the fourth quarter of FY 82 is reported. Included are tasks in the areas of Fission Reactor Neutronics, Transport Methods Supporting Research, Reactor Safety Analysis, Fusion Reactor Nucleonics, and Special Projects.

22739 (LBL—15066-Summ.) **Efficient, radiation-hardened, 800-keV neutral beam injection system.** Anderson, O.A.; Cooper, W.S.; Goldberg, D.A.; Ruby, L.; Soroka, L.; Fink, J.H. (Lawrence Berkeley Lab., CA (USA); Lawrence Livermore National Lab., CA (USA)). Oct 1982. Contract AC03-76SF00098. 3p. (CONF-830406—1-Summ.). NTIS, PC A02/MF A01. Order Number DE83002557.

From 5. topical meeting on technology of fusion energy; Knoxville, TN, USA (26 Apr 1983).

Recent advances and new concepts in negative ion generation, transport, acceleration, and neutrailzation make it appear likely that an efficient, radiation-hardened neutral beam injection system could be developed in time for the proposed FED-A tokamak. These new developments include the operation of steady-state H^- ion sources at over 5 A per meter of source length, the concept of using strong-focussing electrostatic structures for low-gradient dc acceleration of high-current sheet beams of negative ions and the transport of these beams around corners, and the development of powerful oxygen-iodine chemical lasers which will make possible the efficient conversion of the negative ions to neutrals using a photodetachment scheme in which the ion beam passes through the laser cavity.

22740 (LBL—15483) **Neutral-particle-beam production and injection.** Post, D.; Pyle, R. (Lawrence Berkeley Lab., CA (USA); Princeton Univ., NJ (USA). Plasma Physics Lab.). Jul 1982. Contract AC03-76SF00098. 43p. (CONF-820731—2). NTIS, PC A03/MF A01. Order Number DE83006966.

From North Atlantic Treaty Organization Advanced Study Institute conference on atomic and molecular processes in controlled thermonuclear research; Palermo, Italy (19 Jul 1982).

This paper is divided into two sections: the first is a discussion of the interactions of neutral beams with confined plasmas, the second is concerned with the production and diagnosis of the neutral beams. In general we are dealing with atoms, molecules, and ions of the isotopes of hydrogen, but some heavier elements (for example, oxygen) will be mentioned. The emphasis will be on single-particle collisions; selected atomic processes on surfaces will be included.

22741 (NRL-MR—5003) **New measurement techniques using tracers within laser-produced plasmas.** Herbst, M.J.; Burkhalter, P.G.; Duston, D. (Naval Research Lab., Washington, DC (USA)). 6 Jan 1983. Contract AI08-79DP40092. 35p. (CONF-821089—7). NTIS, PC A03/MF A01. Order Number DE83007231.

From 6. international workshop on laser interaction and related plasma phenomena; Monterey, CA, USA (25 Oct 1982).

The use of locally embedded tracers within laser-irradiated solid targets has led to a new class of diagnostic methods for laser-produced plasmas. Demonstrated uses of tracers include the first visualizations of hydrodynamic flow of laser-ablated material and improved spectroscopic measurements of plasma density and temperature profiles; comparisons with a two-dimensional hydrodynamics computer code are shown. Proposed future uses of tracers include the first measurements of fluid velocity profiles and improved determinations of mass ablation rates.

22742 (REPT—81-139) **The belt-shaped screw-pinch reactor.** Bustreaan, M.; Brandt, B.; Damstra, G.C.; Hoekzema, J.A.; Klippel, H.T.; Lievense, K. (FOM-Instituut voor Plasmafysica, Rijnhuizen (Netherlands)). Dec 1981. 70p. NTIS, PC A04/MF A01.

REFS Sponsored by Euratom and Nederlandse Organisatie voor Zuiver-Wetenschappelijk Onderzoek (ZWO).

Economic and technical aspects of a BSPRIL are considered. Force-free currents in a low density outer plasma envelope enable beta to rise to values on the order of 50%. Reactor operation consists of the formation, heating and ignition of a very small amount of the fuel to be burnt in one pulse by the fields generated by normal or superconducting coils. Then follows injection of the greater part of the fuel by DT pellets and consequent plasma heating and expansion by nuclear reactions without undue disturbing of the plasma current configuration. Technical requirements include an insulating first wall and fast rising magnetic fields produced by superconducting coils. A BSPRIL with pulsed superconducting coils is an economically attractive alternative to other toroidal pinch reactors and Tokamaks.. A BSPRIL with normal conducting copper coils is not much more expensive than reactors with stationary superconducting coils.

22743 (UCID—19682) **Improbability of a resonance breakdown in quasi-optical ECRH beam systems for the Magnetic Fusion Test Facility and other mirror systems.** Shearer, J.W. (Lawrence Livermore National Lab., CA (USA)). Feb 1983. Contract W-7405-ENG-48. 20p. NTIS, PC A02/MF A01. Order Number DE83008480.

Quasioptical electron-cyclotron resonant heating (ECRH) beam transmission systems have been proposed for mirror systems as an alternative to pressurized waveguides. An important concern in these systems is the possibility of breakdown and plasma buildup in the fundamental resonance region in the vacuum outside of the plasma. We consider some simple physical arguments concerning both plasma breakdown and Budden tunneling and conclude that breakdown and plasma buildup can be avoided. Our summary lists six steps to consider taking when designing such a quasioptical beam system.

22744 (UCID—19730) **Fusion-neutron effects on magnetoresistivity of copper stabilizer materials.** Guinan, M.W.; Van Konynenburg, R.A. (Lawrence Livermore National Lab., CA (USA)). 24 Feb 1983. Contract W-7405-ENG-48. 27p. NTIS, PC A03/MF A01. Order Number DE83008084.

The objective of this work is to quantify the changes which occur in the magnetoresistivity of coppers (having various purities and pretreatments, and at magnetic fields up to 12 T during the course of sequential fusion neutron irradiations at about 4°K and anneals to room temperature. In conjunction with work in progress by Coltman and Klabunde of ORNL, the results should lead to engineering design data for the stabilizers of superconducting magnets in fusion reactors. These magnets are expected to be irradiated during reactor operation and warmed to room temperature periodically during maintenance.

22745 (UCID—19733) **Preliminary conceptual design study of a suppressed-fission tokamak hybrid.** Grady, D.; Berwald, D.; Garner, J.; Jassby, D.; Karbowski, J.; DeVan, J.; Lee, J.D.; Moir, R.W. (Lawrence Livermore National Lab., CA (USA)). Jan 1983. Contract W-7405-ENG-48. 52p. NTIS, PC A04/MF A01. Order Number DE83008428.

A preliminary design concept for a commercial-size tokamak fusion breeder with a suppressed fission blanket and emphasis on ^{233}U breeding has been formulated. The design is based upon a similar tandem mirror hybrid concept and addresses particular concerns relating to the use of a tokamak for the suppressed fission blanket application. The single most important departure from the tandem mirror reference blanket concept is the substitution of

FLIBE for the liquid lithium used for cooling and in-situ tritium breeding. A concern for excessive MHD-related problems drove the decision to replace the more highly conductive lithium. As a result of the new coolant selection, material compatibility issues mandated changes in the composition of the mobile fuel pellets. In addition, the higher operating temperatures associated with the FLIBE placed more stringent constraints on structural requirements and reduced several design margins. Neutronics analyses predicted relatively poor blanket performance with tritium breeding of 1.02 and fissile ^{233}U breeding of 0.34.

22746 (UCRL—15514) Central-cell blanket-module-maintenance approach for the MARS high-temperature blanket. Young, N.; Sutliff, D.; Tait, D.; Siebert, R.; Coulahan, J.; Garner, J.K.; Gordon, J.D. (Ebasco Services, Inc., New York (USA); General Dynamics Corp., St. Louis, MO (USA); TRW Energy Development Group, Redondo Beach, CA (USA)). Dec 1982. Contract W-7405-ENG-48. 5p. (CONF-830406—2). NTIS, PC A02/MF A01. Order Number DE83004309.

From 5. topical meeting on technology of fusion energy; Knoxville, TN, USA (26 Apr 1983).

The general maintenance philosophy for replacement of modules is reviewed in this paper. This includes a discussion of the method for disassembly of the spent module in a hot bay area. An initial equipment requirements list is developed to support the maintenance approach.

22747 (UCRL—52000-82-12, pp 18-29) **Feasibility of inertial confinement fusion.** Dec 1982. NTIS, PC A02/MF A01.

In Energy and Technology Review.

Recent encouraging experiments are cited that demonstrate the efficient coupling of laser light to targets and new ideas for economically competitive power plants are discussed.

22748 (UCRL—88511) Atomic processes in high-density plasmas. More, R.M. (Lawrence Livermore National Lab., CA (USA)). 21 Dec 1982. Contract W-7405-ENG-48. 43p. (CONF-820731—3). NTIS, PC A03/MF A01. Order Number DE83007360.

From North Atlantic Treaty Organization Advanced Study Institute conference on atomic and molecular processes in controlled thermonuclear research; Palermo, Italy (19 Jul 1982).

This review covers dense atomic plasmas such as that produced in inertial confinement fusion. The target implosion physics along with the associated atomic physics, i.e., free electron collision phenomena, electron states I, electron states II, and nonequilibrium plasma states are described. (MOW)

22749 (UCRL—88552) Initial ICRF heating experiments in the TMX-U central cell. Molvik, A.W.; Falabella, S.; Moore, T. (Lawrence Livermore National Lab., CA (USA)). 18 Feb 1983. Contract W-7405-ENG-48. 5p. (CONF-820210—3). NTIS, PC A02/MF A01. Order Number DE83007362.

From NEPCON '82 WEST; Anaheim, CA, USA (23 Feb 1982).

An ion-cyclotron range of frequencies (ICRF) heating system has been installed in the Tandem Mirror Experiment-Upgrade (TMX-U) central cell. Our initial objective is to heat low density ions in the near field of the antenna. This heating reduces the collisionality of central cell ions, which decreases the filling rate of the thermal barrier by passing ions from the central cell. From power- and particle-balance calculations, we determined that 60 kW of absorbed power is sufficient to heat plasma densities of up to 2×10^{13} cm^{-3}. These power requirements are consistent with ion heating results from the Phaedrus tandem mirror. Based on this, we have installed a 200-kW oscillator/power amplifier, tunable to as low as 1.5 MHz. It drives a 110°, 9 1/2-turn loop antenna that has a commercially built Faraday shield and matching network. The system has been tuned with plasma and is being used for the initial heating studies at the ion-cyclotron frequency ω/sub ci/.

22750 (UCRL—88553) ICRF pumping in the TMX-U transition region. Cummins, W.F.; Rensink, M.E. (Lawrence Livermore National Lab., CA (USA)). 18 Feb 1983. Contract W-7405-ENG-48. 8p. (CONF-830210—2). NTIS, PC A02/MF A01. Order Number DE83007361.

From 5. topical conference on radio frequency plasma heating; Madison, WI, USA (21 Feb 1983).

These studies indicate that ICRF transition pumping is feasible in the TMX-U experiment using moderate frequencies and power levels. Some degree of latitude must be included in the final design to compensate the rough calculations. The possibility of coupling near 2 ω/sub ci/ is attractive but awaits a clearer exposition of the theory and an adequate computer code.

22751 Ablative acceleration of planar targets to high velocities. Grun, J.; Obenschain, S.P.; Ripin, B.H.; Whitlock, R.R.; McLean, E.A.; Gardner, J.; Herbst, M.J.; Stamper, J.A. (Naval Research Laboratory, Washington, D. C. 20375). *Physics of Fluids;* **26**: No. 2, 588-597(Feb 1983).

Laser irradiated targets are ablatively accelerated to velocities near those required for fusion pellet implosions while remaining relatively cool and uniform. The target velocities and velocity profiles are measured using a double-foil method, which is described in detail. Also, the ablation plasma flow from the target surface is spatially resolved, and the scalings with absorbed irradiance of the ablation pressure, ablation velocity, and mass ablation rate are determined. Results are compared with hydrodynamic code calculations.

22752 (LA-tr—83-4) Numerical modeling of the formation of H$^-$ ion beams in surface-plasma sources. Davydenko, V.I.; Khavin, N.G. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. Translation of IIAF—79-27, 1979. 10p. NTIS, PC A02/MF A01. Order Number DE83007270.

Numerical methods were used to study the formation of H$^-$ ion beams in surface-plasma sources. It was established that changes of the geometry of the beam formation system weakly affect the emittance of the resultant beam, but unevenness of the emission current flux and resonance recharging in the accelerating gap substantially increase it. It was shown that the main distortions in the transverse beam phase volume occur in the very beginning stage of formation.

22753 Solid evacuated microspheres of hydrogen. Foster, C.A.; Hendricks, C.D.; Turnbull, R.J. (to Dept. of Energy). US Patent 4,366,112. 28 Dec 1982. Filed date 22 Jun 1976. vp.

PAT-APPL-698555.

A method is provided for producing solid, evacuated microspheres comprised of hydrogen. The spheres are produced by forming a jet of liquid hydrogen and exciting mechanical waves on the jet of appropriate frequency so that the jet breaks up into drops with a bubble formed in each drop by cavitation. The drops are exposed to a pressure less than the vapor pressure of the liquid hydrogen so that the bubble which is formed within each drop expands. The drops which contain bubbles are exposed to an environment having a pressure just below the triple point of liquid hydrogen and they thereby freeze giving solid, evacuated spheres of hydrogen.

22754 Experimental evidence for self-generated magnetic fields and remote energy deposition in Laser-irradiated targets. Yates, M.A.; van Hulsteyn, D.B.; Rutkowski, H.; Kyrala, G.; Brackbill, J.U. (Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Physical Review Letters;* **49**: No. 23, 1702-1704(6 Dec 1982).

In a series of experiments using two-, four-, and eight-beam 10.6-μm-laser irradiation of a variety of target geometries, a significant amount of energy was found to be deposited in regions remote from the focal spots. The deposition patterns can be predicted with a self-generated magnetic field model.

22755 **In-pile tritium permeation experiment.** Longhurst, G.R.; Miller, L.G.; Watts, K.D. (Idaho National Engineering Lab., Idaho Falls (USA)); Kershner, C.J.; Rogers, M.L. (Monsanto Research Corp., Miamisburg, OH (USA). Mound Facility). *Journal of Nuclear Materials;* **111**: 660-662(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN, USA (3 - 7 May 1982).

The experiments in progress are examining various aspects of the permeation of hydrogen isotopes through fusion materials. Of particular importance will be the measurement of permeation due to ion implantation in the presence of a neutron radiation field. Theoretical and early experimental results for these experiments have suggested that sufficient tritium will permeate fusion reactor interior structures that development of a permeation barrier will be needed.

22756 **Deuterium implantation in first wall candidate materials by exposure in the Princeton large torus.** Chang, J.; Tobin, A. (Grumman Aerospace Corp., Bethpage, NY (USA). Research and Development Center); Manos, D. (Princeton Univ., NJ (USA). Plasma Physics Lab.). *Journal of Nuclear Materials;* **111**: 168-172(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN, USA (3 - 7 May 1982).

Titanium alloys are of interest as a first wall material in fusion reactors because of their excellent thermophysical and thermomechanical properties. A major concern with their application to the first wall is associated with the known affinity of titanium for hydrogen and the related consequences for fuel recycling, tritium inventory, and hydrogen embrittlement. Little information exists on trapping and release of hydrogen isotopes implanted at energies below 500 eV. This work was undertaken to measure hydrogen isotope trapping and release at the first wall of the Princeton Large Torus Tokamak (PLT).

22757 **Measurement of erosion and deposition of aluminium in EBT.** Clausing, R.E.; Heatherly, L.; Emerson, L.C.; Colchin, R.J. (Oak Ridge National Lab., TN (USA). Metals and Ceramics Div.). *Journal of Nuclear Materials;* **111**: 180-181(Nov-Dec 1982). Contract W-7405-ENG-26.

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN, USA (3 - 7 May 1982).

Published in summary form only.

22758 **Gas-fueling studies in the PDX tokamak.** Dylla, H.F.; Blanchard, W.R.; Budny, R.; Fonck, R.J.; Owens, D.K.; Schmidt, G.L. (Princeton Univ., NJ (USA). Plasma Physics Lab.). *Journal of Nuclear Materials;* **111**: 211-217(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN, USA (3 - 7 May 1982).

The characteristics of gas-fueling of high power discharges in the PDX tokamak have been investigated using gas-flow, neutral pressure, plasma density, and Hsub(α) emission measurements. The efficiency of gas-fueling was measured for various plasma configurations by comparison of the measured gas-influx rates to the particle exhaust rates inferred from particle decay time measurements. We observe that the fueling efficiency decreases significantly with increasing plasma density as the ionization length for thermal neutrals becomes shorter than the width of the boundary plasma. Gas fueling rates required to maintain a given plasma density are considerably higher (by factors of 5-10) for diverted discharges compared to limiter discharges. This result is attributed to a lower effective recycling coefficient for diverted plasmas. We discuss the dependence of the particle balance on the following experimentally measured parameters: the particle containment time, system pumping speed, and neutral pressure in the vicinity of the active pumps.

22759 **Recycling studies in the ISX-B by monitoring the hydrogen alpha emission.** Young, R.; Thomas, E.W.; Legg, K.O. (Georgia Inst. of Tech., Atlanta (USA). School of Physics); Emmoth, B. (Forskningsinstitutet foer Atomfysik, Stockholm (Sweden)); Cook, T.B. (Oak Ridge National Lab., TN (USA)). *Journal of Nuclear Materials;* **111**: 218-220(Nov-Dec 1982).

From 5. international conference on plasma surface interactions in controlled fusion devices; Gatlinburg, TN, USA (3 - 7 May 1982).

Preliminary studies are reported of hydrogen recycling in the ISX-B Tokamak using Balmer alpha radiation to monitor the local density of hydrogen. Calibrated detectors comprising a narrow band filter, lens and photodiode have been set up at various points around the Tokamak to record Hsub(α) emission from a column intersecting the plasma sheath. For constant plasma conditions the optical signal is shown to be proportional to the local flux of hydrogen entering the plasma from the wall. The response of this signal to gas, neutral beam and pellet injection has been studied in a number of discharges.

22760 **Fracture strength of sintered and siliconized SiC and SiC joints.** Trantina, G.G. (GE, Schenectady, NY, USA). *American Ceramic Society Bulletin;* **61**: No. 5, 555-558(May 1982).

Fracture strength properties that are related to the design of ceramic structures were evaluated. Methods to increase the strength of silicon carbide are described. 13 refs.

22761 **Tensile and torsional fatigue of fiber-reinforced composites at cryogenic temperatures.** Wang, S.S.; Chim, E.S.M.; Socie, D.F.; Gauchel, J.V.; Olinger, J.L. (Univ of Ill, Urbana, USA). *Journal of Engineering Materials and Technology;* **104**: No. 2, 121-127(Apr 1982).

A study of the fundamental fatigue behavior of G-10 grade, glass fiber-reinforced composite laminate in a liquid nitrogen environment is presented. Both uniaxial tensile and pure torsional fatigue failure of the fiber composite are investigated. Cryogenic fatigue degradation of the composite in terms of stiffness reduction, energy dissipation, and cyclic fracture is examined in detail. Influences of loading mode, fiber orientation, surface condition, and geometric variables are studied also. Fatigue damage mechanisms at cryogenic temperatures under various loading conditions are discussed. 29 refs.

22762 **Biaxial fatigue of fiber-reinforced composites at cryogenic temperatures - 1. Fatigue fracture life and mechanisms.** Wang, S.S.; Chim, E.S.M.; Socie, D.F. (Univ of Ill, Urbana, USA). *Journal of Engineering Materials and Technology;* **104**: No. 2, 128-136(Apr 1982).

A study of biaxial fatigue of glass fiber-reinforced composites subjedted to in-phase, cyclic tensile and torsional loading at cryogenic temperatures is presented. Fatigue failure of the composite is investigated in terms of cyclic fracture, stiffness degradation, and energy dissipation. Fatigue fracture lives of the cryogenic composite are obtained for the cases of various combinations of cyclic tensile and torsional stresses. A power-law realtionship is established between the range of cyclic octahedral shear stress and the number of cycles to fracture. Influences of hydrostatic mean stress and stress biaxiality ratio on fatigue fracture of the fiber composite are determined. Fracture mechanisms in the material during the cryogenic biaxial fatigue are examined by using optical and scananing electron microscopes. 21 refs.

22763 **Intertial confinement fusion.** Keefe, D. (Lawrence Berkeley Laboratory, University of California, Berkeley, California 94720). *Annual Review of Nuclear Science;* **32**: No. 1, 391-441(1982). Contract AC03-76SF00098.

The application of laser fusion to the generation of electric power is discussed. (AIP)

22764 **Large magnets: where we are, and where we must go.** Montgomery, D.B. (MIT, Cambridge, MA, USA). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Magnetics;* **MAG-17**: No. 5, 1541-1550(Sep 1981). (CONF-810340—).

From 7. international conference on magnet technology; Karlsrube, F.R. Germany (30 Mar 1981).

There is a great deal of interest in magnet technology. There are major projects in construction and serious planes for significant scale-ups; it is therefore of particular value to examine the process of scale-up. For example, some of the future magnets considered by the MHD and Fusion Communities seem very large relative to the present level of accomplishment. Topics discussed include large magnets for high energy physics, energy storage magnets, the Mirror fusion program as well as the tokamak program. Recommendations for a realistic test program are considered. 56 refs.

22765 **EBT-R magnet system concept.** Lieurance, D.W. (Gen Dyn, San Diego, CA). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Magnetics;* **MAG-17**: No. 5, 1695-1698(Sep 1981). (CONF-810340—).

From 7. international conference on magnet technology; Karlsrube, F.R. Germany (30 Mar 1981).

The Elmo Bumpy Torus fusion concept has been extrapolated to a 1,200 Mw electrical power plant. The toroidal magnets required will store more than 2,500 times the energy of those proposed for EBT-P. EBT-reactor (EBT-R) magnets may each store 3.5 gigajoules of energy and weigh approximately 750,000 kg. 3 refs.

22766 **Preliminary magnet design for a stellarator fusion reactor.** Van Sciver, S.W.; Derr, J.; Shalil, A.; Sviatoslavsky, I.N. (Univ of Wis, Madison, USA). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Magnetics;* **MAG-17**: No. 5, 1703-1706(Sep 1981). (CONF-810340—).

From 7. international conference on magnet technology; Karlsrube, F.R. Germany (30 Mar 1981).

Conceptual design of the superconducting magnets for a stellarator fusion power reactor UWTOR-M are presented. The emphasis in the magnet design is toward modularity and maintainability by approximating the continuous helical coil geometry with a number of discrete windings. Magnetic field requirements are reasonable (B/sub max/ approximately 10 T) allowing for modest extrapolations of present technology. The unique features of the design are: (1) use of NbTiTa with superfluid helium cooling to achieve high current density cryo-stability; (2) a monolithic conductor, made possible by the lack of pulsed magnetic fields; and (3) an innovative construction technique required by nonaxisymmetric geometry of the magnets. 8 refs.

22767 **Light propagation through large laser systems.** Simmons, W.W.; Hunt, J.T.; Warren, W.E. (Lawrence Livermore National Lab., CA). *IEEE (Institute of Electrical and Electronics Engineers) Journal of Quantum Electronics;* **QE-17**: No. 9, 1727-1744(Sep 1981). Contract W-7405-ENG-48.

The evolution of solid-state laser systems over the past decade, both through technological advances and through increased understanding of the interplay between nonlinear effects and linear diffraction, is reviewed. The role of numerical methods to simulate the several physical processes (diffraction, self-focusing, gain saturation) involved in coherent beam propagation through large laser systems is discussed. A comprehensive simulation code for modeling all of the pertinent physical phenomena observed in laser operations (growth of small-scale modulation, spatial filtering, imaging, gain saturation, and beam induced damage) is described in detail. The realism and accuracy of results obtained with this numerical code stem from an unambiguous identification of the sources of spatial noise, and from the use of spatial filters in modern lasers to limit the transverse beam modulation scale within the practical computational range of a two-dimensional numerical analysis. Several comparisons between code results and solid-state laser output performance data are presented. Finally, the design and performance estimation of the large Nova laser system presently under construction at the Lawrence Livermore National Laboratory (LLNL) are given.

22768 **Short-pulse oscillator development for the Nd:glass laser-fusion systems.** Kuizenga, D.J. (Lawrence Livermore National Lab., CA). *IEEE (Institute of Electrical and Electronics Engineers) Journal of Quantum Electronics;* **QE-17**: No. 9, 1694-1708(Sep 1981). Contract W-7405-ENG-48.

This paper describes the development of an actively modelocked and Q-switched (AMQ) Nd:YAG oscillator system that generates a single pulse at 1.06 μm in the range of 100 ps to 1 ns, with energy of ~ 250 μJ, and with good stability and reliability. A stable single axial mode Q-switched oscillator is also described that generates a long smooth pulse out of which pulses in the ns range are sliced. Synchronization of these two oscillators is also discussed.

22769 **Light ion ignitors for inertial confinement fusion: Progress toward proof-of-principle.** Quintenz, J.P.; Kuswa, G.W. (Sandia National Labs., Albuquerque, NM (USA)). pp vp of Annual meeting on nuclear technology '81. Specialists' meeting: Fusion. Eggenstein-Leopoldshaften, Germany; Fachinformationszentrum Mathematik (1981).

From Annual meeting on nuclear technology; Dusseldorf, F.R. Germany (24 Mar 1981).

The progress which has been made forward proof-of-principle using lylet ion ignitors, as well as the remaining problems, are detailed in this paper. Some of the main points are: Target requirements and performance, ion diodes for beam generation, plasma channels for beam transport, pulse power development, reactor concepts, target injection, production of ion beams, and wall protection. (GG).

22770 **Hybrid reactors.** Moir, R.W. (California Univ., Livermore (USA). Lawrence Livermore National Lab.). pp 68 of Annual meeting on nuclear technology '81. Specialists' meeting: Fusion. Eggenstein-Leopoldshaften, Germany; Fachinformationszentrum Mathematik (1981).

From Annual meeting on nuclear technology; Dusseldorf, F.R. Germany (24 Mar 1981).

The rationale for hybrid fusion-fission reactors is the production of fissile fuel for fission reactors. A new class of reactor, the fission-suppressed hybrid promises unusually good safety features as well as the ability to support 25 light-water reactors (LWRs) of the same nuclear power rating, or even more high-conversion-ratio reactors such as the heavy-water type. One 4000-MW nuclear hybrid can produce 7200 kg of ^{233}U per year. To obtain good economics, injector efficiency times plasma gain (etasub(i)Q)-should be greater than 2, the wall load should be greater than 1 MW x m^{-2}, and the hybrid should cost less than 6 times the cost of a light-water reactor. Introduction rates for the fission-suppressed hybrid are unusually rapid. (orig.).

22771 **Material problems in plasma fusion.** Ullmaier, H. (Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Festkoerperforschung). pp 68 of Annual meeting on nuclear technology '81. Specialists' meeting: Fusion. Eggenstein-Leopoldshaften, Germany; Fachinformationszentrum Mathematik (1981). (In German)

From Annual meeting on nuclear technology; Dusseldorf, F.R. Germany (24 Mar 1981).

In this report the radiation defects in the interior of material of the first wall and the blanket structure are discussed, which are induced by fast neutrons. (GG).

22772 **Overview of the U.S. programme on particle control and divertors.** Oktay, E. pp 17-19 of IAEA Technical Committee meeting on divertors and impurity control. Keilhacker, M.; Daybelge, U. (eds.). Garching, Germany; Max-Planck-Institut fuer Plasmaphysik (1981).

From IAEA Technical Committee meeting on divertors and impurity control in tokamaks; Garching (Germany, F.R.) (6 - 9 Jul 1981).

In this overview, the particle control and divertor issues are reviewed briefly, the status of the U.S. experimental programs relevant to this topic are mentioned, and the future direction of the program is discussed. The results of experiments will be presented by the participants from the U.S. laboratories.

22773 **Recent PDX results.** Bol, K. pp 20-22 of IAEA Technical Committee meeting on divertors and impurity control. Keilhacker, M.; Daybelge, U. (eds.). Garching, Germany; Max-Planck-Institut fuer Plasmaphysik (1981).

From IAEA Technical Committee meeting on divertors and impurity control in tokamaks; Garching (Germany, F.R.) (6 - 9 Jul 1981).

PDX Group.

In this paper the authors first summarize the machine aspects that bear on impurity control, then impurity injection experiments, fueling of the discharge and energy flow with and without beam injection, and finally the present status of the beam injection experiment and the encouraging results that have been obtained.

22774 **Expanded boundary divertor experiments in Doublet III.** Wesley, J.C.; Brooks, N.; De Boo, J.C.; DeGrassie, J.S.; Groebner, R.J.; Hsieh, C.L.; Mahdavi, M.A.; Ohyabu, N.; Stambaugh, R.D.; Taylor, T. pp 32-34 of IAEA Technical Committee meeting on divertors and impurity control. Keilhacker, M.; Daybelge, U. (eds.). Garching, Germany; Max-Planck-Institut fuer Plasmaphysik (1981).

From IAEA Technical Committee meeting on divertors and impurity control in tokamaks; Garching (Germany, F.R.) (6 - 9 Jul 1981).

The expanded boundary divertor is a simplified poloidal divertor configuration where the outermost flux surfaces of the plasma are expanded and diverted to interact the walls near the midplane of the vacuum vessel by coils located outside the vessel. Impurity exhaust is discussed and desirable divertor 'geometry aspects'.

22775 **Remote radiative cooling and helium ash exhaustion with single-null poloidal divertor in Doublet III.** Nagami, M.; Shimada, M.; Ioki, K.; Izumi, S.; Maeno, M.; Yokomizo, H.; Shinya, K.; Yoshida, H.; Brooks, N.; Hsieh, C.L. pp 35-37 of IAEA Technical Committee meeting on divertors and impurity control. Keilhacker, M.; Daybelge, U. (eds.). Garching, Germany; Max-Planck-Institut fuer Plasmaphysik (1981).

From IAEA Technical Committee meeting on divertors and impurity control in tokamaks; Garching (Germany, F.R.) (6 - 9 Jul 1981).

This work presents the remote radiative cooling at the divertor and helium exhaustion function with the single null poloidal divertor in Doublet III, discusses the formation of divertor equilibrium and impurity control with this simplified divertor, localized particle accumulation and recycling at the divertor, remote radiative cooling, helium ash exhaustion.

22776 **Divertor scrape-off studies.** Owens, D.K. pp 38 of IAEA Technical Committee meeting on divertors and impurity control. Keilhacker, M.; Daybelge, U. (eds.). Garching, Germany; Max-Planck-Institut fuer Plasmaphysik (1981).

From IAEA Technical Committee meeting on divertors and impurity control in tokamaks; Garching (Germany, F.R.) (6 - 9 Jul 1981).

The investigation of the scrape-off plasma in the Poloidal Divertor Experiment plasma parameters, energy balance and particle flow in diverted discharges. A simple particle flow model has been used to provide a framework for interpreting the measurements and to suggest the physical processes which must be included in any model of the plasma. The topics for which experimental results are presented and discussed include particle and energy flow in double and single null divertor configurations, energy balance and edge plasma density dependence on main plasma density, fueling by gas puff, edge plasma parameters, and recycling from the divertor. Initial results from pellet injection and neutral beam heating as these topics relate to fueling and edge plasma conditions are also presented.

22777 **Divertor modelling.** Schmidt, J.A. pp 55-57 of IAEA Technical Committee meeting on divertors and impurity control. Keilhacker, M.; Daybelge, U. (eds.). Garching, Germany; Max-Planck-Institut fuer Plasmaphysik (1981).

From IAEA Technical Committee meeting on divertors and impurity control in tokamaks; Garching (Germany, F.R.) (6 - 9 Jul 1981).

Models have been developed for the behavior of poloidal divertor channels in tokamaks. The purpose of these computer codes is to improve our understanding of present divertor experiments and project the conditions for future divertor operation. The most advanced codes include a Monte Carlo analysis of the multispecies neutral behavior coupled to a plasma model comprising a particle and energy flow algorithm. Initial studies with these codes indicate an important mode of divertor operation with very little neutral backflow from the divertor channel. The associated plasma influx to the divertor is also small, producing a high density, relatively low temperature edge condition.

22778 **Numerical simulations of the bundle divertor.** Howe, H.; Wootton, A.J. pp 64 of IAEA Technical Committee meeting on divertors and impurity control. Keilhacker, M.; Daybelge, U. (eds.). Garching, Germany; Max-Planck-Institut fuer Plasmaphysik (1981).

From IAEA Technical Committee meeting on divertors and impurity control in tokamaks; Garching (Germany, F.R.) (6 - 9 Jul 1981).

Published in summary form only.

22779 **TFTR impurity control.** Meade, D.M. pp 88-90 of IAEA Technical Committee meeting on divertors and impurity control. Keilhacker, M.; Daybelge, U. (eds.). Garching, Germany; Max-Planck-Institut fuer Plasmaphysik (1981).

From IAEA Technical Committee meeting on divertors and impurity control in tokamaks; Garching (Germany, F.R.) (6 - 9 Jul 1981).

TFTR is a high-energy-density beam-driven tokamak that will utilize both two-component and thermonuclear DT reactions to achieve 'approximate energy breakeven' in the mid 1980's. High-energy-density plasmas, disruptions and DT operation impose severe design constraints on the TFTR impurity control system. The TFTR energy removal system consists primarily of a large area axisymmetric toroidal limiter covered with TiC coated graphite tiles. Recycling control is accomplished with a regenerable Zr Al getter pump that covers approx. equal to 10% of the torus wall. The performance of TFTR will depend significantly on the success of the TFTR impurity control system. This paper gives a status report on the requirements, design concepts and prototype tests for the moveable limiter, bellows cover plates, bumper limiter, and surface pumping system.

22780 **Modelling of the INTOR poloidal divertor.** Post, D.E.; Petravic, M.; Schmidt, J.A.; Heifetz, D. pp 96 of IAEA Technical Committee meeting on divertors and impurity control. Keilhacker, M.; Daybelge, U. (eds.). Garching, Germany; Max-Planck-Institut fuer Plasmaphysik (1981).

From IAEA Technical Committee meeting on divertors and impurity control in tokamaks; Garching (Germany, F.R.) (6 - 9 Jul 1981).

Computational models have been used to assist in the design of a poloidal divertor system for INTOR. The divertor is to be used to handle and control the expected particle and heat outflux from INTOR of approx. equal to 10^{23} particles/sec and 80-100 MW of thermal plasma energy. The divertor must be able to handle the heat load without excessive cooling requirements for the neutralizer plates and divertor walls, and without large erosion rates for the divertor walls and neutralizer plates. Large erosion rates would lead to unacceptably large impurity levels in the main plasma and require frequent replacement of the divertor structure. 100 MW of fusion thermal power corresponds to a production of approx. equal to 2 x 10^{20} alpha particles/sec. This helium ash must be removed from the discharge to allow long pulse (approx. equal to 50 sec) operation. A two dimensional model was constructed to examine these questions. The neutral gas transport is calculated using Monte Carlo techniques. The collisions of neutrals and ions with the walls are handled using experimental reflection data. The relevant atomic collision processes are included.

22781 TFTR impurity control prototype tests. Cecchi, J.L.; Dylla, H.F.; Fonck, R.J.; Knize, R.J.; Kugel, H.W.; Okabayashi, M.; Owens, D.K.; Ulrickson, M.; Sredniawski, J.J. pp 97 of IAEA Technical Committee meeting on divertors and impurity control. Keilhacker, M.; Daybelge, U. (eds.). Garching, Germany; Max-Planck-Institut fuer Plasmaphysik (1981).

From IAEA Technical Committee meeting on divertors and impurity control in tokamaks; Garching (Germany, F.R.) (6 - 9 Jul 1981).

The control of impurities and hydrogen recycling in TFTR are essential elements in realizing the most favorable operating parameters for the device. Work in this area has included calculations to optimize limiter configurations. Another major effort has been the investigation of possible surface pumping systems to control impurities and recycling while being compatible with the TFTR radiated heat load and the requirement to generate adsorbed tritium. We have undertaken a series of prototype experiments which are described.

22782 ISX divertor program. Jernigan, T.C.; Lyon, J.F.; Montgomery, D.B.; Sheffield, J.; Wing, W.R.; Rome, J.A.; Hively, L.M.; Wootton, A.J.; Wysor, R.B.; Yang, T.F. pp 101 of IAEA Technical Committee meeting on divertors and impurity control. Keilhacker, M.; Daybelge, U. (eds.). Garching, Germany; Max-Planck-Institut fuer Plasmaphysik (1981).

From IAEA Technical Committee meeting on divertors and impurity control in tokamaks; Garching (Germany, F.R.) (6 - 9 Jul 1981).

Published in summary form only.

22783 Optimization of bundle divertors. Hively, L.M.; Rome, J.A.; Fowler, R.H.; Lynch, V.E.; Lyon, J.F. pp 101 of IAEA Technical Committee meeting on divertors and impurity control. Keilhacker, M.; Daybelge, U. (eds.). Garching, Germany; Max-Planck-Institut fuer Plasmaphysik (1981).

From IAEA Technical Committee meeting on divertors and impurity control in tokamaks; Garching (Germany, F.R.) (6 - 9 Jul 1981).

Published in summary form only.

22784 Mechanical divertors design considerations. Schmidt, J.A. pp 123-125 of IAEA Technical Committee meeting on divertors and impurity control. Keilhacker, M.; Daybelge, U. (eds.). Garching, Germany; Max-Planck-Institut fuer Plasmaphysik (1981).

From IAEA Technical Committee meeting on divertors and impurity control in tokamaks; Garching (Germany, F.R.) (6 - 9 Jul 1981).

Tokamak experiments wich mechanical limiters have demonstrated their acceptability under present operating conditions. The simplicity of mechanical limiter configurations make them a good candidate for future tokamak edge control. To be acceptable for reactor applications, provision must be made for the removal of helium ash. Present design studies indicate that limiters with pumping channels will facilitate helium removal. An experimental data base has been developed which supports the use of limiters in this role.

22785 Pumped limiter development on ISX. Mioduszewski, P.K.; Edmonds, P.H.; Sheffield, J. pp 127 of IAEA Technical Committee meeting on divertors and impurity control. Keilhacker, M.; Daybelge, U. (eds.). Garching, Germany; Max-Planck-Institut fuer Plasmaphysik (1981).

From IAEA Technical Committee meeting on divertors and impurity control in tokamaks; Garching (Germany, F.R.) (6 - 9 Jul 1981).

Pumped limiter configurations are being suggested for FED and INTOR for helium ash exhaust and fuel particle control. The goal of the pump limiter studies in ISX is the selection of the most promising concept and its evaluation in the ISX-C device under the following conditions: 1. quasi steady state operation (<= 30s), 2. high edge power densities, 3. particle control by means of mechanical devices. We are considering various options, including particle scraper and ballistic particle collection concepts as well as the current FED design. In ISX-B we will test a full-size pump limiter and directly compare the heat removal and particle control capabilities with a bundle divertor. In ISX-C the steady state operation characteristics of pump limiters will be explored.

22786 PDX mechanical divertor experiments. Jacobsen, R. pp 130-131 of IAEA Technical Committee meeting on divertors and impurity control. Keilhacker, M.; Daybelge, U. (eds.). Garching, Germany; Max-Planck-Institut fuer Plasmaphysik (1981).

From IAEA Technical Committee meeting on divertors and impurity control in tokamaks; Garching (Germany, F.R.) (6 - 9 Jul 1981).

A preliminary plasma edge particle scoop limiter has been installed on the equator of the Princeton Divertor Experiment (PDX), a large tokamak. The scoop limiter is unique in that it is designed such that the plasma plugs the entrance throat thereby impeding the return flow of neutralized gas to the discharge. Neutral gas pressures of the order of 50 microns were measured inside the scoop. The pressure dependence on electron density in the scrapeoff plasma at the throat entrance was stronger than linear. A full size scoop limiter is under construction and will soon be installed on PDX. It has been designed to be sufficiently thermally robust so as to act as the sole limiter in a PDX discharge with 1.5 MW of neutral beam heating.

22787 Cluster beam ionizer having the self-acceleration mechanism. Be, S.H.; Yano, K.; Kodaira, K.; Kawai, S. (Inst of Phys and Chem Res, Saitama, Japan). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1506-1509(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The purpose of the present paper is to describe the results of the computer simulation and the experiment on the new cluster ionizer proposed before. The gradient of the space-potential in the ionizer has an axial component that favors the cluster ion beam flow. This was ascertained from the results of the computer simulation and the experiment.

22788 Structural performance of plasma chamber design concepts for EBT-P. Ruester, D.E.; Delaney, M.J. (McDonnell Douglas Astronaut Co, St. Louis, MO, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1709-1712(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The plasma chamber for the Elmo Bumpy Torus - Proof of Principle (EBT-P) must maintain a vacuum tight enclosure under an intense x-ray and microwave heating environment. A conceptual design study was conducted to determine the feasibility of a stainless steel plasma chamber that uses metal seals. Due to the low thermal conductivity of stainless steel, life of the plasma chamber is very design dependent. However, a stainless steel integrally cooled plasma chamber design was shown to satisfy a 10-year life requirement for EBT-P.

22789 Fuel density-radius diagnostic for inertial confinement fusion experiments. Blue, T.E.; Durham, J.S.; Reyes, J.J.; Wehring, B.W.; Blue, J.W. (Univ of IL, Urbana, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1051-1054(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The fuel density-radius product (/rho/R) is an important parameter in inertial confinement fusion (ICF) experiments. A number of methods for measuring the tamper and fuel /rho/R of ICF targets have been proposed and developed. This paper considers a diagnostic for the direct measurement of fuel /rho/R in D/sub 2/ filled ICF targets.

22790 Fusion-product energy-loss measurements from laser-imploded micro-balloons. Miley, G.H.; Choi, C.K.; Blue, T.E.; Bennish, A.H.; Coggeshall, S.V.; Harris, D.B. (Univ of Ill, Urbana, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1055-1057(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Measurements of charged fusion-product-energy spectra as a diagnostic for the determination of /rho/R of the fuel and tamper in inertial-confinement targets, and the study of possible anomalous effects in the slowing down of the charged fusion-products in extremely high density and temperature plasmas is performed.

22791 Infrared monitoring of the Doublet III beam armor plate. McMahon, T.; Kamperschroer, J.; Colleraine, A.; Kim, J.; McColl, D.; Tooker, J.; Treglio, J. (Gen At Co, San Diego, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1071-1073(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

An 80 keV, 3.6 MW neutral beam injection system has recently been installed on Doublet III, and the installation of a second system is scheduled within several months. Armor plate consisting of /approximately equals/100 graphite tiles (10 cm x 10 cm) coated with TiC has been plated over portions of the inner vacuum wall lying in the line of sight of the ion sources. In order to monitor the condition of the armor plate an infrared camera and a set of optical pyrometers have been installed alongside the beamline and view the armor plate through a CaF/sub 2/ window. The pyrometers measure the temperature of the armor plate associated with the maximum of the intensity distribution of each ion source.

22792 CAMAC module for waterflow calorimetry. Jacobson, V.; Fiddler, J.; Greer, J. (Lawrence Berkeley Lab, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1078-1081(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Waterflow calorimetry would seem to be a natural diagnostic for Neutral Beam Injectors: it requires simple transducers, is non-destructive and directly measures the 'bottom line' number of delivered neutral power. Real Time Systems Group, Lawrence Berkeley Laboratory has developed a micro-processor based CAMAC module for doing waterflow calorimetry which gives an energy measure accurate to better than 2% within 1 minute after a shot. The modules are relatively inexpensive and have been proven in normal operation at LBL's Neutral Beam System Test Facility. This paper describes the module and experience gained in its development and operation.

22793 Design and analysis of a stable support structure for TFTR diagnostics. Zatz, I.J.; Lontai, L.; Goldfarb, S. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1122-1125(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The Multichannel Far Infra Red Interferometer (MIRI) for TFTR employs phase comparison of 119 micrometer radiation in a Michelson (double pass) configuration for measurement of plasma electron density. MIRI accommodates up to ten vertical probing beams approximately evenly spaced across the plasma minor diameter. To reduce relative movement of critical components of these diagnostics, a stiff, damped, isolated structure was designed. Long-term drifts such as thermal effects and creep are compensated just prior to the measuring interval. The structure is designed to provide short term stability with excitation from machine electromagnetic fields and building vibration during the nominal one second measuring period. The design process allowing for this stability was aided and optimized by using dynamic applications of the finite element method.

22794 Fusion engineering development plan. Haas, G.M. (US DOE, Washington, DC, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 15-19(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The Fusion Engineering Development Plan (FEDP) is a lengthy document over a hundred pages, representing a substantial amount of detail. This paper presents the background and the thinking that went into putting this Plan together, rather than to explore in detail the material that is in the Plan. Discussed are the objectives and the elements of FEDP. They include plasma systems, nuclear systems, reactor systems, and system integration.

22795 Perspective on the industrial role in fusion. Kummer, D.L. (McDonnel Douglas Astronaut Co, St. Louis, MO, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 20-22(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The paper discusses the variety of industrial companies working with fusion. It lists the reasons why industry should be involved in the fusion development phase. How industry might be involved in fusion is summarized. Also discussed are some of the major subsystems and areas of work in fusion programs, and some of the factors that determine the choice.

22796 Technology transfer: the key to fusion commercialization. Burnett, S.C. (Gen At Co, San Diego, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 23-25(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The paper brings to light some of the reasons why technology transfer is difficult in fusion, examines some of the impediments to the process, and finally looks at a successful example of technology transfer. The paper considers some subjective features of fusion - one might call them the sociology of fusion - that are none the less real and that serve as impediments to technology transfer.

22797 General approach to quality in design. Osborne, W.J. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 27-29(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Design engineers, either consciously or unconsciously, use quality work elements to achieve quality in design. these quality work elements are identified, classified as basic or optional, and explained. The rationale for applying them to the design of fusion devices is presented in terms of effects on performance and costs. Relevant quality terms are defined, and elements of the design quality system are described. Quality of design is the direct responsibility of the design engineer.

22798 Enhanced operations through designing in reliability and maintainability. DeMund, T.W. (Grumman Aerosp Corp, Bethpage, NY, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 30-33(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

This paper describes the application of Reliability and Maintainability Programs tailored from the requirements found in MIL-STD-785 and MIL/STD-470 and applied to the design of the Tokamak Fusion Test Reactor. The program had three primary objectives, to prove the adaptability of the tailored methods to an experimental system, to provide tangible improvements to the design of IFTR by the application of Reliability and Maintainability techniques, and to provide an indoctrination to the design personnel by participation in the design process.

22799 **Designing quality into software.** Becker, D.R. (Lawrence Livermore Natl Lab, CA, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 34-36(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Software Quality Assurance has become an area of high interest because of expectations of higher programmer productivity, fewer errors in the final program, and thus overall reduced costs for software development. QA techniques are conceptually simple and should be implemented prior to software design or code writing. This paper briefly describes the QA techniques implemented for MFTF-B.

22800 **Interfacing between concrete and steel construction and fusion research devices.** Willoughby, E. (Giffels Assoc Inc, Southfield, MI, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 37-38(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

In 1976 Giffels Associates, Inc. an architect/engineer organization, was retained by the United States Department of Energy to provide Title I and Title II design services and Title III construction inspection services for the Tokamak Fusion Test Reactor now being installed at the Princeton Plasma Physics Laboratory in Princeton, New Jersey. Construction of the complex required to house and serve the reactor itself, designed by others, now commencing. During building construction several problems occurred with respect to the interface between the building design, construction and the fusion device (reactor). A brief description of some of these problems and related factors is presented, which may be of benefit to those persons active in continuing fusion research and experimental work.

22801 **Exchange of design quality 'lessons learned'.** Bohn, F.H. (Kernforschungsanlage Juelich, Germany, F.R.). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 39-42(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

This paper has been prepared for the use of the attendees of the quality assurance workshop: 'How can more quality be designed into fusion facilities?' The topics are chosen for discussion and development of subsequent summaries during the workshop. They concentrate therefore on specific subjects of quality assurance for the design phase of fusion projects. Special emphasis is given to the question how can design quality be improved to quality assurance approaches and to tools. Examples on lessons learned are shown.

22802 **Engineering overview of EBT-P device systems.** Hamilton, W.R.; Imster, H.F. (Union Carbide Corp, Oak Ridge, TN, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 47-50(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The device and the facility for the Elmo Bumpy Torus Proof of Principle (EBT-P) experiment are to be constructed at the Valley Industrial Park at Oak Ridge, Tennessee by the McDonnell Douglas Astronautics Company under contract to the Union Carbide Corporation - Nuclear Division. This paper describes the major design features of the overall EBT-P device and each of its systems.

22803 **Bottoms up design of the Elmo Bumpy Torus - proof of principal (EBT-P) fusion research facility.** Erickson, D.T. (McDonnell Douglas Astronaut Co, St. Louis, MO, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 56-59(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The McDonnell Douglas Astronautics Company, under subcontract to the Union Carbide Corporation Nuclear Division at the DOE Oak Ridge National Laboratory has committed to furnish the EBT-P research facility. Gilbert Associates, Inc. of Reading, Penysylvania, as the Architect and Engineering subcontractor has been selected for design and construction of this facility. The bottoms up effort to provide the EBT-P facility is now alive and well, with the property purchased, dedication ceremonies conducted, the Preliminary Design effort completed and detail design currently active.

22804 **Role of systems integration in EBT-P.** Hass, D.W. (McDonnell Douglas Astronaut Co, St. Louis, MO, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 60-63(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Systems integration is an element of design engineering dealing with configuration management, interface control, maintainability and design-to-cost analyses. Configuration management consists of identification, control, and status accounting of the configuration. The flow of these elements throughout the engineering cycle is presented. Typical maintainability design criteria for seals, disconnects, lines, etc. are described as they apply to EBT-P. Design-to-cost analyses are essential in examining the overall design and defining the lowest cost alternatives which affect both construction and operating costs. Every proposed design change is accompanied by a detailed cost assessment. Several examples of cost savings design techniques to be used on EBT-P are discussed.

22805 **EBT-P instrumentation and control system - overview.** Schmitt, R.J. (McDonnell Douglas Astronaut Co, St. Louis, MO, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 64-67(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

MDAC-STL is currently under contract to ORNL to design and construct the EBT-P device at a non-government-owned site in Oak Ridge, Tenn. Design of the EBT-P Instrumentation and Control (L and C) design has been underway since Oct. 1980. The RFP baseline (I and C) design has been iterated into a preliminary design which has recently been reviewed by ORNL and DOE. This paper presents an overview of the I and C System design as it exists now that is keyed to the EBT-P facility layout.

22806 **EBT-P data acquisition system design.** Boyd, B.A. (McDonnell Douglas Astronaut Co, St. Louis, MO, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 68-71(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The data acquisition system for EBT-P is being designed to fulfill five major EBT-P device data handling functions: acquisition, display, processing, storage, and transmission. These functions are performed by a hierarchical system of micro- and mini-computers arranged in a flexible network structure. The facility computer has responsibility for gathering data from the various subsystem microprocessors, storing it for both near-term access and permanent historical record, and displaying it on the EBT-P master control console (MCC) CRT display panels. The main operator interface to the computer is via several color graphics display terminals in the EBT-P (MCC). Programmable Logic Controllers which have the major responsibility for EBT-P device control and interlocking also feed data to the microprocessors via a high-speed data highway link.

22807 **Remote welding and cutting for the JET project.** de Burbure, S.; Galbiati, L.; Raimondi, T. (JET Jt Undertaking, Abingdon, Oxfs, England). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1138-1142(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

There are increasing requirements for joining, separating and rejoining pipes or ducts of various shapes for very demanding applications, such as high vacuum or sodium containment in a radioactive environment. Welding is considered, in these cases, the most reliable joining method. In general the joining and separating operations must be repeated a number of times and motorized carriages automatically guided are envisaged. This solution is often preferred even if personnel access is allowed as it gives reliable results and avoids human errors. This paper discusses the problems encountered and gives viable solutions.

22808 Influence of reactor maintenance considerations on the design of a commercial EBT power plant. Zuckerman, D.S. (McDonnell Douglas Astronaut Co, St. Louis, MO, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1158-1161(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

An analysis of the scheduled reactor maintenance requirements of an Elmo Bumpy Torus Reactor (EBTR) and their effect on the reactor and reactor-building design was performed. The requirements for scheduled maintenance are that blanket replacement be accomplished in less time than that required for annual scheduled balance-of-plant maintenance (28 days), that capital and operating costs be minimized and availability maximized. Three circular reactor-building concepts were evaluated: a reactor building with permanent space outboard of the reactor for maintenance operations; a building with permanent maintenance space above the reactor; and a mobile maintenance module concept where the module moves around the perimeter of the reactor building and provides temporary space for maintenance at the required location. This paper presents the rationale for selection. of the first option. Time estimates and equipment requirements for first-wall/blanket/shield (FWBS) replacement are presented.

22809 TFTR diagnostic voltage loops. Cavalluzzo, S.; Goldfarb, S. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1162-1164(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Voltage loops are single turn coils positioned parallel to the toroidal plasma column which provide a measure of the ohmic heating voltage. The loops are formed by stranded stainless steel conductors with polyimide insulation which are threaded through segmented tubes attached to the exterior of the vacuum vessel. This paper briefly reviews the voltage loop function and presents the design requirements. The design solution is described and the remote handling installation tools and procedure are described and illustrated. Environmental tests and installation trials using a full scale mockup are reported.

22810 Conceptual design of laser fusion reactor, SENRI-I - 1. concept and system design. Ido, S.; Naki, S.; Norimatsu, T. (Osaka Univ, Japan). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1184-1187(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Design features of a laser fusion reactor concept SENRI-I and new concepts are reviewed and discussed. The unique feature is the utilization of a magnetic field to guide and control the inner liquid Li flow. Basic requirements and typical parameters used in the design are presented. Items to be discussed are constitution of the system, performance of liquid Li flow, neutronics, thermo-electric cycle, fuel cycle and new concepts.

22811 Conceptual design of laser fusion reactor, SENRI-I - 2. tritium breeding ratio, neutron streaming to laser beam ports and final mirrors. Oomura, H.; Ido, S.; Nakai, S.; Yamanaka, C. (Ishikawajima-Harima Heavy Ind Co, Tokyo, Japan). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1188-1191(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The purpose of this study is to investigate the neutronics and photonics features of the SENRI-I, especially the effects of laser beam ports on the blanket neutronics and to estimate the fluence of laser beam guide mirrors. Models and data used are briefly described. Flux distribution thermal deposition in the blanket, tritium breeding and the d.p.a. (displacement per atom) are examined and neutronic behavior of final elements are discussed.

22812 Global trade studies for the fusion engineering device (FED). Reid, R.L.; Wu, K.F. (Oak Ridge Natl Lab, TN, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1298-1301(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The effects of plasma minor radius, neutron wall loading, and inboard shield thickness on FED performance and cost were examined. It was observed that decreasing the plasma radius, at fixed wall loading, yields an increased burn time at the expense of a reduction in Q and slightly increased cost. It was also found that increasing the neutron wall loading /plus or minus/20/PERCENT/ resulted in a change of /plus or minus/10 720 in capital cost. It was further observed that inboard shield thickness variation has a minimal effect on capital cost when maintaining a fixed plasma minor radius and a fixed field at the TF coils.

22813 FED control power. Murray, J.G.; Bronner, G. (Princeton Univ, NJ, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1302-1305(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Position control of the plasma in FED or in any reactor type of magnetic toroidal confined fusion machine becomes more of an engineering challenge than the present day plasma experimental devices. This paper briefly describes the structural features which play a dominant role in effecting position control and emphasizes the differences associated with present experimental devices and reactor relevant machines. It outlines the features of startup and disruption to describe their interdependence in determining the design requirements for control. An explanation of the scope of this study is provided with the procedures established to investigate position control requirements. The assumption made and a description of the specific components of the structures which were included in the studies are given. The present FED results and conclusions are then presented.

22814 Performance of the BNL Mk-V steady state magnetron H source. Hershcovitch, A.; Prelec, K.; Alessi, J. (Brookhaven Natl Lab, Upton, NY, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1368(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The MkV magnetron source has been designed with the goal to achieve an H-or D-yield of 1-2 A in pulses longer than 5 s up to a steady state mode of operation. All electrodes are water cooled and this allows power densities up to 200 W/cm/sup 2/. The source has been operated in hydrogen and hydrogen-cesium modes. Various methods of cesium vapor injection have been tried and their reliability compared. The extractor grid in its first version has been made out of solid molybdenum, without cooling, and operated in a pulsed mode (pulse length more than 1 s).

22815 Performance of the Culham multi-megawatt beam line facility. Hammond, D.P.; Cottrell, G.A.; Coupland, J.R. (Culham Lab, Abingdon, Oxfs, England). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1538-1541(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The Culham Megawatt Beam Line has been upgraded in order to test injector modules for the JET experiment. The major items provided are: a high voltage modulator tube system, modified auxiliary supplies, new vacuum tanks and cryopumps, a high power beam pump, additional tanks and cryopumps, a high power data acquisition system. Delivery of the first complete JET prototype source and accelerator was scheduled for the end of 1981. The major components, having been tested separately as far as possible, are now installed and are being tested up to the 80kV, 12A level of the existing plasma source.

22816 **Facility approach to tokamak operation.** Edmonds, P.H.; Gabbard, W.A. (Oak Ridge Natl Lab, TN, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1692(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

In anticipation of the appearance of more advanced tokamaks and other fusion relevant experiments, program has been established at ORNL to systemically identify the requirements of an effective machine operations group. This program is presently applied to the ISX-B experiment. With its continuing development, it is expected to provide major support in the identification of potential problem areas and to assist in the generation of the necessary procedures for forthcoming devices. The present and future generations of large plasma devices will function as facilities, operated by an operations group as service to the plasma physicists and diagnosticians. The purpose of the program discussed here is to develop and to encourage an orderly transition to the facility-like style of operation.

22817 **Engineering design of the Beta IV experiment.** Morse, E.C.; McNamara, B. (Univ of Calif, Berkeley, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1693-1696(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The Beta IV reactor design is a conceptual extension of the current Beta-II project at LLNL which would test various engineering systems in a fusion environment. This device would extend the technology of compact torus plasma confinement from present experiments to a small-scale power producing device. The reactor studied in this report was chosen to have a thermonuclear power output of 100 MWth and a Q of 25. Injected power is therefore 4 ME in long pulse, with a startup gun providing an initial energy input of 50 MJ. start up is accomplished by a Marshall type gun which is scale-up of the presently operating Beta-II gun.

22818 **Fabrication of the bonded center leg for TEXT iron yoke.** Polk, D.H.; McFarlin, D.J. (United Technol Corp, East Hartford, CT, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1697-1700(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The center leg of the Texas Experimental Tokamak (TEXT) iron yoke is designed not only to maximize and mounting structure. In particular, it reacts the forces and moments on the toroidal field coils, resulting in local shear stresses up to 1000 psi. Because of these structures required to minimize eddy current losses could not be fabricated using conventional transformer core techniques. Instead, the center leg structure was formed from 0.660 in., type C1010 steel plates, zinc phosphate treated to enhance bond adhesion and to provide interlaminar insulation, and bonded with an epoxy adhesive. Upon installation, the specified 1.6 volt-sec flux change was confirmed in low power tests, and, in TEXT machine operations to date, the leg has met all electrical and structural requirements.

22819 **Varennes tokamak - an experiment for fast current rampdown, quasi-continuous operation and impurity control studies.** Couture, P.; Geoffrion, J.; Gregory, B.C.; Van Andel, H.W.H.; Bolton, R.A.; Cumyn, P.B.; Stansfield, B.L.; Terreault, B. (Hydro-Que, Varennes, Canada). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1701-1704(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

The parameters and special features of the Varennes quasi-continuous tokamak are presented and the poloidal field is discussed in some detail.

22820 **Thermoelectric MHD affects heat flow in fusion technology.** Shercliff, J.A. (Univ of Cambridge, England). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1794-1796(1981). (CONF-811040—).

From 9. symposium on engineering problems of fusion research; Chicago, IL, USA (26 Oct 1981).

Seebeck currents generated at the interface between liquid lithium and its container In a magnetic field cause motions which affect the relation between the temperatures and the heating/cooling, and hence the thermal expansion and stresses. Unsteadiness could cause thermal cycling. The paper surveys the present level of understanding of TEMHD thermal convection, indicating likely effects and the scope for exploiting them or the dangers which they imply.

22821 **Argonne plasma engineering experiment (APEX) tokamak.** Norem, J.H.; Balka, L.J.; Kulovitz, E.C.; Magill, S.R.; McGhee, D.G.; Moretti, A.; Praeg, W.F. (Argonne Natl Lab, IL, USA). *Proceedings of the Symposium on Engineering Problems of Fusion Research;* 1680-1683([nd]).

This paper describes the design and operation of the Argonne Plasma Engineering Experiment (APEX) tokamak. This machine was designed to provide a high performance plasma at a minimum cost, thus combining, to some extent, The high current densities, long pulse duration, and flexibility of operation of large, multipurpose machines, with the low cost of small machines. The APEX tokamak was designed specifically for studies in plasma-wall interactions and RF heating and current drive, and some tradeoffs were made in order to optimize the device for this purpose. Special features of this design included use of the self-centering force of the toroidal field coil to simplify the mechanical design of the coils and digital equilibrium field control.

99 GENERAL AND MISCELLANEOUS

22822 **(DOE/IR/05114—1) Energy Deskbook.** Glasstone, S. (Glasstone (Samuel), Oak Ridge, TN (USA)). Jun 1982. Contract AC05-76IR05114. 463p. NTIS $12.50.

The purpose of the Energy Deskbook is to serve as a convenient reference to definitions of energy-related terms and descriptions of current and potential energy sources and their utilization. The material is presented at a low technical level with emphasis on general principles, which are not difficult to understand, rather than technology. The entries vary in length from a few lines to several pages, according to circumstances. As a general rule, each topic is defined and outlined in the first paragraph; this may be followed by a more detailed treatment, as required. An important feature of the Deskbook is the use of boldface (heavy) type for cross references. Words in the text set in boldface are the titles of articles where the particular subjects are described.

22823 **(UCRL—88686) Decision-making in large-scale military simulation: a requirement for expert systems.** Erickson, S.A. Jr.; Balaban, D.J.; Nelson, D.O. (Lawrence Livermore National Lab., CA (USA)). 1 Feb 1983. Contract W-7405-ENG-48. 22p. NTIS, PC A02/MF A01. Order Number DE83007343.

Computerized war-gaming and combat simulation represents a very fertile application area for artificial intelligence. In a war game or detailed simulation one typically finds multiple decision-making agents, each performing the tasks for which artificial intelligence (AI) is well-suited, such as hypothesis formulation, pattern recognition, planning, scheduling, and resource allocation, performed in an environment full of uncertainty and incomplete, distorted, or disguised information. The decision-makers are gathered together into two or more hierarchies, with information flow inside each hierarchy subject to interpretation and error.

9901 Management

REFER ALSO TO CITATION(S) 20754

22824 **(ANL/NESC—947) CPDREV; spare parts inventory control system.** Morgenthaler, A.C. (Rockwell International Corp., Richland, WA (USA). Rockwell Hanford Operations). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048947.

CPDREV assumes that the inventory item has a predictable sales life, and that the transition costs of passing from one order period to the next consist primarily of the order costs, the inventory carrying costs, and the penalty costs caused by backordering customer requests.

CPDREV was developed to determine proper stock levels for an inventory of process spare parts. The program determines the amount of material to buy, and when it should be bought. CPDREV can compute an implied risk from a prespecified penalty cost, or conversely, the implied penalty cost from a prespecified risk level. The frequency of reordering is computed to provide a basis for distributing the projected workload among buyers and expeditors and to avoid an overstocked inventory. CPDREV is designed to assist maintenance managers in preparing spare parts purchase recommendations.UNIVAC1100;CDC6600,CYBER74,175; FORTRAN (99%) and Assembly language (1%); EXEC8 (UNIVAC1100), SCOPE 3.4.4 (CDC6600,CYBER74), NOS 1.3 (CDC CYBER175); If the programs are segmented, 62,000 words of memory are required to execute the UNIVAC1100 version; the CDC6600 version requires 136,000 (octal) words on a CDC CYBER175.

22825 (CNEN-RT/AMB—(81)2) ALEATO: code for processing numerical data by IBM-370. Dentico, G.; Pacilio, N. (Comitato Nazionale per l'Energia Nucleare, Casaccia (Italy). Dipartimento Reattori Veloci; Comitato Nazionale per l'Energia Nucleare, Casaccia (Italy). Dipartimento Ricerca Tecnologica di Base e Avanzata). Jan 1981. 25p. (In Italian). Dep. NTIS (US Sales Only), MF A01. Order Number DE82903049.

The ALEATO code processes digital data of random nature looking for the distribution of probability that best fit the histogram of experimental data. The choice option for the distributions covers the Bemoulli, Poisson and Polya profiles. The code is self-determining the choice of the fit through an usher that guides and estimates the likelihood.

22826 (PP—60-19) Interim report to the President and the Congress. Kirk, R.J. (Office of Personnel Management, Washington, DC (USA). Office of Compensation Program Development). Sep 1981. 263p. Office of Personnel Management Compensation Group, Office of Compensation Program Development, 1900 E Street, NW, Washington, DC 20415.

The Alternative Work Schedules (AWS) experiment is a three-year evaluation established by the Federal Employees Flexible and Compressed Work Schedules Act of 1978 (Public Law 95-390), which suspended certain provisions of title 5, USC to allow two types of schedules. These are flexible schedules which allow employees to vary arrival times and the length of work days, and compressed schedules which allow the organization to schedule 80 hours in fewer than 10 working days in a two week day period (e.g., 4 to 10 hour days each week, or 5 days one week, and 4 days the next week for a total of 80 hours in a pay period). Public Law 95-390 required the Office of Personnel Management (OPM) to establish an AWS experiment, and to report the findings to the President and Congress. The experiment included more than 1500 experimenting organizations with over 325,000 employees. These experiments cover the entire spectrum of Federal agencies and activities and range from small individual work units of five to ten employees to entire agencies with employees throughout the country such as the General Accounting Office.

9902 Mathematics And Computers

REFER ALSO TO CITATION(S) 19475, 19476, 19790, 20666, 21232, 21480, 21631, 21780, 22073, 22241

22827 (ANL/NESC—364R) SNEQ; nonlinear algebraic equation solutions and curve plotting. Lechliter, G.L. (Knolls Atomic Power Lab., Schenectady, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048364.

In SNAP the maximum number of unknowns is 50. In EQPLT the pseudo-FORTRAN equation is two-dimensional, having an independent variable, a dependent variable, and a parameter. The parameter may assume up to 6 values for any one graph, 100 constant values, and up to 200 values for the independent variables.

SNEQ consists of the two codes, SNAP and EQPLT, which have been merged due to their common use of the SLIP compiler. SNAP interprets and solves pseudo-FORTRAN input equations representing nonlinear algebraic systems. EQPLT interprets pseudo-FORTRAN input equations and calculates and plots multiple curves on a single graph. EQPLT is useful for parameter studies.CDC6600; FORTRAN IV and ASCENT.

22828 (ANL/NESC—386) DATATRAN2; modular programming and data system. Kopp, H.J.; Schilling, W.E. (Knolls Atomic Power Lab., Schenectady, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048386.

DATATRAN2 is a data base management system for a scientific and engineering modular program environment. DATATRAN consists of a set of extensions to the FORTRAN language designed to simplify the development, interconnection and use of large computer programs in a scientific and engineering environment. It allows users to easily connect a series of functional program units (modules) to perform a specific task.CDC6600,7600,CYBER176; FORTRAN (85%), COMPASS (15%); SCOPE 3.1, 3.2, 3.3 or SCOPE 3.4 (CDC6600 Edition B), SCOPE 1.1 (CDC7600 Edition B), and SCOPE 2.1 (CDC7600,CYBER176 Edition C); 64K memory, 2 disks, and permanent storage media such as tapes are required; in addition, CDC6600 usage requires 30K words of ECS and CDC7600 usage 20K words of LCM..

22829 (ANL/NESC—411R) M0661;M0657;M0626; polynomial curve fitting. Shimamoto, T. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048411.

M0661, M0657, and M0626 perform statistical analyses of data based on a least squares polynomial fit.CDC6600; FORTRAN IV; SCOPE 3.1; CDC280 plotter for the graphical output.

22830 (ANL/NESC—428R) DOGGY; desk calculator form sheet DP package. Gazda, S.A. (Knolls Atomic Power Lab., Schenectady, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048428.

Maxima of - 150 columns of input 100 rows per column.

DOGGY can perform most routine form sheet calculations. The program can handle common arithmetic manipulations on columns of input such as addition, subtraction, multiplication, and division. It also has provisions for the use of special functions such as logarithmic, trigonometric, arc trigonometric, hyperbolic, exponential, square root, maxima, minima, and raising a number to any power. DOGGY also calculates water properties such as thermal conductivity, viscosity, and Prandtl Number over a wide range of temperature and pressure.CDC6600; FORTRAN IV and ASCENT.

22831 (ANL/NESC—442R) SIMPLE1; time-sharing programming language. Barrett, M.F. (Knolls Atomic Power Lab., Schenectady, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048442.

SIMPLE1 compiles and executes multistatement calculations typed in a familiar algebraic notation at a time-shared terminal, immediately returning requested results to the terminal and permitting ad lib continuation of a calculation. The user may use the system as an extended and powerful electronic calculator, or as a calculator of small load-and-go runs. Errors are detected and corrected on an as-you-go basis. Calculations may include interactive input/output, functions, and loops.CDC6600; FORTRAN IV and ASCENT; SCOPE.

22832 (ANL/NESC—444R) ROPE; finding roots of a polynomial. Mitchell, N.R. (Knolls Atomic Power Lab., Schenectady, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048444.

ROPE can find roots of polynomials of order up to 99.

ROPE is used to calculate roots of polynomials.CDC6600; FORTRAN IV.

22833 (ANL/NESC—445R) LIZARD4; nonlinear differential equations solution. Dolk, D.R. (Knolls Atomic Power Lab., Schenectady, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048445.

Maximum of - 25 nonlinear first-order differential equations.

LIZARD4 is used to solve nonlinear, ordinary differential equations as a one-shot effort. It was written to solve initial value equations, that is, the values of the dependent variables must be specified at some initial value of the independent variable. One-dimensional steady-state boundary value problems can be solved with LIZARD4, providing an iterative method is employed by the user where one of the boundary conditions is specified and integration proceeds until the alternate boundary condition is met.CDC6600; FORTRAN IV and ASCENT.

22834 (ANL/NESC—446R) MOST; a multidimensional optimization scheme. Lubitz, C.R.; Shanholt, G.A. (Knolls Atomic Power Lab., Schenectady, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048446.

The maximum dimension of the search is 20.

MOST is designed to vary a set of coordinates (x1,x2, . . . ,xn) representing the vector x in such a way that a specified function y(x), y(x) greater than or equal to 0, is minimized.CDC6600; FORTRAN IV.

22835 (ANL/NESC—478) BETTIS ENVIRONMENTAL ROUTINES; MODEL6/3.3;MODEL7/2.0; modified Bettis Environmental Library scope 3.3. Pfeifer, C.J. (Westinghouse Electric Corp., West Mifflin, PA (USA). Bettis Atomic Power Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048478.

The BETTIS ENVIRONMENTAL ROUTINES extend the FORTRAN language by modifying some of the standard CDC6600 library routines and by adding routines to the library to facilitate decimal input and output, file maintenance, scratch I/O, storage allocation, utility functions, operating system interfacing, and operator communication. MODEL (MODified Environmental Library) differs from the original Bettis version in that it allows the operating system, rather than the environmental package, to control the operating environment.CDC6600,7600; FORTRAN IV and ASCENT (Bettis), FORTRAN IV and COMPASS (MODEL 6/3.3, MODEL 7/2.0); SCOPE 2.0 (Bettis), SCOPE 3.3 (MODEL), SCOPE 2.0 (MODEL 7/2.0); For the Bettis version 65,356 words of 60-bit core storage (more or less can be used), a system (6603) disk, at least 2 magnetic tapes, at least 4 non-system disks, each on its own channel, and CDC-280 plotting hardware. For the MODEL versions 65,356 words of 60-bit core storage (more can be used), 2 magnetic tapes, and 4 mass storage devices, each on its own channel.

22836 (ANL/NESC—484) FIGS; IBM360 and 2250 FORTRAN graphics subroutines. Dunford, C.L. (Atomics International Div., Canoga Park, CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048484.

FIGS is a FORTRAN-callable subroutine package for the support of interactive computing programs utilizing an IBM System/360 computer and an IBM2250 display unit.IBM360; FORTRAN IV and BAL; OS/360; IBM360 computer with an attached IBM2250 display unit.

22837 (ANL/NESC—496R) KAPLPLOT; KAPL CalComp plotting routines. Brooking, J. (Knolls Atomic Power Lab., Schenectady, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048496.

KAPLPLOT is the set of standard CalComp subroutines written at Knolls Atomic Power Laboratory to provide graphic output. GRLIN is used to draw an axis system, establish scaling factors, and enable the user to draw linear graphs. GRLOG is used to draw an axis system, establish scaling factors, and permit users to draw full logarithmic graphs. LINLG provides the capability of drawing semi-logarithmic graphs with linearly-scaled abscissas while LOGLN provides the same capability with linearly-scaled ordinates. PENSET initializes the plotting subroutines and draws the job identification, time, date, and charge number. PENEND moves the pen off a completed plot and prevents subsequent plots from overwriting the completed plots. IPLOT moves the plotter pen from its current position to a new position. IDPLOT moves the pen a specified incremental distance in inches from its present position. PSCALE establishes the value of factors to be used by the SPLOT subroutine in scaling user data to fit on plotter coordinates. SPLOT causes the pen to move to coordinates which are obtained by applying PSCALE scale factors to user data. XCPLOT and YCPLOT cause alphabetic information to be written parallel to the direction of the abscissa axis, XCPLOT, or the ordinate axis, YCPLOT. PMARK causes a distinctive symbol to be plotted at the current position of the pen. PLTSIZE conveys to the plotting system information which will enable the plotting system to place the maximum number of plots in a minimum length of paper.CDC6600; FORTRAN IV and ASCENT; SCOPE; GRLIN, LINLG, and LOGLN each require 2000 octal locations.

22838 (ANL/NESC—514) FORSIM; solution of partial or ordinary differential equations. Carver, M.B. (Atomic Energy of Canada Ltd., Chalk River, Ontario. Chalk River Nuclear Labs.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048514.

Maximum of - 1000 ordinary differential equations.

FORSIM is a FORTRAN oriented simulation program which automates the continuous transient solution of systems of ordinary and/or partial differential equations. The user writes his equations in a FORTRAN subroutine, following prescribed rules, and loads this routine along with the executive routines. The executive routines then read in initial data supplied by the user and proceed with the integration.CDC6600; FORTRAN Extended; SCOPE 3.4; 160,000 (octal) memory and 6 disk files, including input and output.

22839 (ANL/NESC—515) GENED ENVIRONMENTAL ROUTINES; subroutine library. Wassem, F.A. (General Electric Co., San Jose, CA (USA). Nuclear Energy Div.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048515.

The GENED ENVIRONMENTAL ROUTINES consists of a set of standard routines written at the General Electric Nuclear Energy Division and a set of standard GE635 system routines.GE635; FORTRAN IV AND GMAP; GECOS

22840 (ANL/NESC—516) PTAC11; 2-pass assembler for the PDP-11 on 360. Killian, E.W. (EG and G Idaho, Inc., Idaho Falls (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048516.

The number of user defined symbols is limited to 800. The standard DEC mnemonics are used with two exceptions. The alternate mnemonics for BCC (branch if carry clear) and BCS (branch if carry set) are not used. The mnemonic for break trap is called BPT.

PTAC11 allows a programmer to assemble binary code for the Digital Equipment Corporation PDP-11 computer on the IBM360/75, taking advantage of the facilities and speed of the larger machine.IBM360/75; PL/I; OS/360; 100K bytes memory, usual I/O units and one tape unit.

22841 (ANL/NESC—519) **NRTS OS/360 Remote Job Entry; OS/360 MVT remote job entry system.** Richardson, L.C. (EG and G Idaho, Inc., Idaho Falls (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048519.

NRTS allows users at remote locations to submit jobs over slow or high speed communication lines to an IBM system 360/75 using the operating system that provides multiprogramming with a variable number of tasks. This program is an extension of the standard RJE program. Once a job has been entered execution proceeds under OS job management routines.IBM360/75; Assembler; OS/360 MVT Release 19.6; IBM360 with minimum of 512K bytes storage, using OS/360 MVT and an IBM2701 data adapter unit with synchronous data adapter TYPEII with the binary synchronous features, equipped for EBCDIC code and full transparency operation. Dual interface feature is required if line is to be switched between slow and high-speed operation. Direct access storage for RJE tables is typically less than 1-2311 DASD or 1-2314 disk pack. SYSIN data requirements are installation dependent. IBM1130 work station requirements include a single disk storage drive, 8K words of core storage, 1442-7 card read/punch, 1403-2 with RPQ F20724 or 1403-6 printer, binary synchronous communications adapters. Optionally, a 1627-1 plotter, 2415 magnetic tape, 1134 paper tape reader, 1055 paper tape punch, 2501 card reader, and 2250-4 scope are supported.

22842 (ANL/NESC—530) **GENRD; free-format card input processor.** Cox, C.W. (Lawrence Livermore National Lab., CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048530.

There is no provision for typing double precision, complex, or logical input. GENRD cannot recognize octal or other nonstandard input forms. Hollerith information cannot be continued from one card to the next nor can it be contained within a repeat specification.

GENRD will read and process free-format numeric and Hollerith input data from cards.CDC6600;IBM360; ANSI Standard FORTRAN; SCOPE 3 (CDC6600) and DOS (IBM360); 3000 decimal words of core, usual I/O, and one tape or disk unit.

22843 (ANL/NESC—541) **WSP-HASP/DOS; DOS-MFT remote workstation package.** McMahon, R.J. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048541.

The WSP (Work Station Package) is a modification of the standard HASP/RMT360 package supplied by IBM and runs on a multiprogrammed DOS System/360/30 using multi-leaving and binary synchronous communications to communicate with a System/360/195/ASP central CPU.IBM360; DOS Assembler language; 360 DOS Release 26.1. The ANL System/360/195 ASP central CPU is operating with Version 2.6.5 of ASP requiring no changes; WSP has been designed for a System/360/30 with an IBM 2540 reader-punch, two IBM 1403 printers, an IBM 1052 printer keyboard console, and an IBM 2701 data adapter unit.

22844 (ANL/NESC—849) **PORTABLE LISP; a list-processing interpreter.** Taylor, W.P. (Lawrence Livermore National Lab., CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048849.

The main restriction is the amount of list space used by the program. By changing the statement CONST MAXNODE = 600 to CONST MAXNODE = 2000 a much larger expression can be evaluated. A major feature of LISP, the ability to define and retain function definitions, is not implemented. This is a necessary extension for a useful LISP system.

The program constitutes a complete, basic LISP (LIST-Processing language) interpreter. LISP expressions are evaluated one by one with both the input expression and the resulting evaluated expression printed. Expressions are evaluated until a FIN card is encountered. Between expression evaluations a garbage-collection algorithm is invoked to recover list space used in the previous evaluation.CDC7600; PASCAL; SCOPE; The sample problem was executed in 7000 (octal) words of memory on a CDC7600.

22845 (ANL/NESC—857) **TIDY3;TIDY4; utility to edit fortran source programs.** Jackson, J. (BCS Richland, Inc., WA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048857.

Maxima of - 50 different tabular, non-executable statements (TIDY4) 20 characters in a single array name including DIMENSION specifications (TIDY4) 500 distinct statement labels excluding FORMAT statements (TIDY3) 250 distinct FORMAT statement labels (TIDY3) 20 nested DO loops (TIDY3) 19 TYPE statements (TIDY3).

TIDY is a utility program for processing FORTRAN source programs into a standard form which is easy to read and modify. In processing FORTRAN software it renumbers statement labels so that they appear in increasing order, removes statement labels from unreferenced statements and deletes unreferenced FORMAT and CONTINUE statements, indents DO loops and IF levels (IF level by TIDY4 only), and collects and groups TYPE, DATA, and EQUIVALENCE statements (TIDY3 collects only TYPE statements). Each group is alphabetized and rewritten in a column-aligned manner. FORMAT statements are, optionally, either inserted following the first reference or optionally collected at the end of the code. Blanks are inserted and removed to improve readability.CDC CYBER74,175;UNIVAC1100; FORTRAN IV (TIDY3), FORTRAN ASCII (98%), Meta-Assembler (1%), and Assembler (1%) (TIDY4); SCOPE 3.4 (CDC CYBER74), NOS 1.3 (CDC CYBER175), EXEC8 (UNIVAC1100); Four mass-storage units are used for storage. 30K words of memory are required for TIDY4 execution. TIDY3 requires 46,000 (octal) words of memory.

22846 (ANL/NESC—860) **PDFPLOT; statistical distribution functions.** Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Atwood, C.L. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048860.

PDFPLOT produces plots of different types of estimated probability density functions and cumulative distribution functions. Optional output includes a listing of the cumulative probabilities.CDC CYBER76;CDC7600; FORTRAN IV (88%) and COMPASS (12%); SCOPE 2.1; 45,000 (octal) words of memory are needed to execute the program.

22847 (ANL/NESC—864) **UPD; source deck maintenance utility routine.** Perry, G.W.; Medlin, T.W. (Tennessee Valley Authority, Chattanooga (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048864.

UPD can handle any kind of 80-column source cards provided columns 73-80 are available for use as a sequence field. A deck is defined as a series of cards that have the same four characters in columns 73-76, while a sequence number occupies columns 77-80 of each source card within the deck. Typically, there is one deck for each subprogram, and the deck name is either the subprogram name or a derivative of it. Blanks may appear in the deck name only on the right, and only digits are allowed in columns 77-80. UPD, however, can also operate on source decks that do not have any sequence numbers in columns 77-80.

UPD is a source card maintenance program which enables the user to make many changes to an existing source deck stored on tape or disk while keeping a simple, accurate record of those changes, which include inserting, deleting, or replacing cards in the existing source deck.IBM360,370,303x;Amdahl470; FORTRAN IV (64%) and BAL (36%); OS/360; 150K bytes of memory, standard input and output units (logical units 5 and 6) and direct access units for the old master file (logical unit 4), the auxiliary file (logical unit 7), the new master file (logical unit 8), and a temporary file (logical unit 99) as required for execution.

22848 (ANL/NESC—866) INTEROP; nonlinear optimization algorithms. Rasmuson, D.M.; Thurgood, R.L. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048866.

The program is dimensioned for a maximum of 20 parameters and 20 states.

The INTERactive OPtimization system (INTEROP) is a collection of search direction algorithms for constrained and unconstrained nonlinear optimization problems. The search direction algorithms available in INTEROP include: modified Fletcher-Powell, modified Fletcher-Reeves, steepest-descent Newton, homogeneous predictor, and modified Powell.CDC CYBER173;CDC6600,7600; FORTRAN IV (90%) and COMPASS (10%); SCOPE 3.4.4 (CDC6600), SCOPE 2.1.3 (CDC7600); INTEROP requires approximately 130K (octal) words for execution on a CDC6600 and 76K (octal) words on a CDC7600.

22849 (ANL/NESC—867) PAMA; preferred acquisition method analysis. Jones, R.G. (Sandia National Labs., Albuquerque, NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048867.

Deviation from the standard cost elements or other special situations must be processed as hand-entered adjustments. Adjustments cannot be made to lease payments.

PAMA is an interactive COBOL program which through an inquiry procedure calculates the preferred method of acquisition of ADP equipment. The Preferred Acquisition Method Analysis leads to a lease, lease with conversion to purchase, or lease to ownership (or deferred purchase) versus purchase analysis. This methodology is intended to be applied to small procurements under $400,000 and to sole source procurements over $400,000, and can provide budget-supporting justification for all procurements. For the larger competitive procurements, a purchase versus lease methodology based on monthly life cycle analysis is preferred.CDC6600; COBOL; NOS and SCOPE 3.4.4; 66,000 (octal) words of memory are required for PAMA.

22850 (ANL/NESC—872) CATCH; map projection subroutine package. Tucker, T.C.; Campbell, L.J. (Union Carbide Corp., Oak Ridge, TN (USA). Computer Sciences Div.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048872.

The Clarke 1866 spheroid is assumed but a subroutine is included to simplify changing to any other ellipsoid.

CATCH (Computer-Assisted Topography, Cartography, and Hypsography) is a compatible and extensible collection of subroutines to perform a number of common map projection calculations. Included in the collection are the Albers equal area, the Lambert conformal, the Universal Transverse Mercator, the U.S. Polyconic, and the various state plane coordinate systems. Optional higher-level subroutines having the projection name as one parameter, are provided to call the projection subroutines. This facilitates use of the projection subroutines in applications programs. A general subroutine for bilinear transformation of one quadrilateral to another was developed for translating, rotating, and scaling the plane coordinates and can be used for very large-scale, approximate projections.IBM360,370,303x; FORTRAN IV; OS/370; 152K bytes of storage are required for execution.

22851 (ANL/NESC—879) SAMPLE; Monte Carlo uncertainty analysis code. Goldberg, F.F. (Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Regulatory Research). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048879.

The program permits normal, log-normal, and log-uniform distribution types to be specified for the input variables, and all of the input variables must have the same distribution type. Other distribution types and changes allowing each variable to have any of the distribution types could easily to added.

The SAMPLE program uses Monte Carlo simulation to compute the mean, standard deviation, probability range, and distribution for the function $y=f(x(1), x(2), . .x(k))$ given that the distributions of x(1), x(2), ..x(k) are known and the functional dependence of y on the x's is known.IBM360,370,303x; FORTRAN IV; OS/360,370; 140K bytes were required to execute the sample problem.

22852 (ANL/NESC—881) ELEFUNT; tests of Fortran elementary functions. Cody, W.J. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048881.

The package contains one subroutine (MACHAR) for dynamic determination of parameters describing the floating-point arithmetic system of the host machine. Should this hardware-sensitive subprogram malfunction, the test programs must be modified to insert the necessary machine-dependent parameters in DATA statements, or otherwise make them available. This computing environment inquiry routine is known to malfunction when the arithmetic registers are wider than the storage registers.

ELEFUNT is a FORTRAN test package for the elementary functions. Each program is an aggressive test of one or more of the elementary function subroutines generally supplied with the support library accompanying a FORTRAN compiler. Functions tested are ALOG/ALOG10, ASIN/ACOS, ATAN, EXP, POWER, SIN/COS, SINH/COSH, SQRT, TAN/COTAN, and TANH.IBM360,370,303x;CDC6600,7600; UNIVAC1108,1100; FORTRAN; OS/370 (IBM3033), SCOPE 3.4.4 (CDC6600), SCOPE 2.1.5 (CDC7600), and EXEC8 (UNIVAC1100); The maximum space required by any one test driver is 50K bytes on an IBM3033, 16,000 (octal) words on a CDC6600, 5700 (octal) words on a CDC7600, and 3600 words on a UNIVAC1100/44.

22853 (ANL/NESC—882) GSMP; general systems analysis modeling code. Cook, J.M. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048882.

The General System Modeling Program (GSMP) is designed for use by systems analysis teams. Though developed primarily for the modeling of advanced energy conversion systems, it is designed to model any object satisfying the most general definition of the word 'system'. Given compiled subroutines that model the behavior of components plus instructions as to how they are to be interconnected, GSMP links them together to model a complete system. Standard system-analytic services are provided: parameter sweeps, graphics, free-form input and formatted output, file storage and retrieval, error diagnostics, component model and integration checkout facilities, sensitivity analysis, and an optimizer with nonlinear constraint capability. Steady-state or cyclic time-dependence is simulated directly, initial-value problems only indirectly.IBM370,303x; PL/I (90%), FORTRAN IV (9%), and Assembly language (1%); OS/370; If the system optimization capability is invoked, storage requirements vary from approximately 0.5 to 1 megabyte or more depending on the size of the system model.

22854 (ANL/NESC—884) VUGRAPH; plots presentation-quality viewgraphs. Knox, R.J. (Lawrence Livermore National Lab., CA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048884.

Horizontal plots normally are contained within a 7.5 inch wide x 6.25 inch high rectangle, with optional expansion to 9 inches x 7 inches. Vertical plots are contained within a 7 inch wide x 9 inch high rectangle. Text lines in a choice of four colors may be oriented horizontally or vertically. Character size and aspect ratio are continuously variable. Type styles include italics and some other modifications of the minicomputer's basic character set.

VuGRAPH offers a convenient means of generating professional quality four-color viewgraph transparencies (or small posters) in a variety of character sizes and styles using the HP9825A minicomputer with the HP9872A plotter system.HP9825A; HPL; An HP9825S system, consisting of an HP9825A desktop computer with 23K bytes of memory, and equipped with both the String-Advanced Programming ROM and the Plotter-General I/O ROM and an HP9827A plotter are required.

22855 (ANL/NESC—888) MINPACK1; nonlinear equations & least squares. Garbow, B.S. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048888.

MINPACK1 is a package of FORTRAN subprograms for the numerical solution of systems of nonlinear equations and nonlinear least squares problems. The individual subprograms are: IDENTIFICATION DESCRIPTION CHKDER Check gradients for consistency with functions DOGLEG Determine combination of Gauss-Newton and gradient directions DPMPAR Provide double precision machine parameters ENORM Calculate Euclidean norm of vector FDJAC1 Calculate difference approximation to Jacobian (nonlinear equations) FDJAC2 Calculate difference approximation to Jacobian (least squares) HYBRD Solve system of nonlinear equations (approximate Jacobian) HYBRD1 Easy-to-use driver for HYBRD HYBRJ Solve system of nonlinear equations (analytic Jacobian) HYBRJ1 Easy-to-use driver for HYBRJ LMDER Solve nonlinear least squares problem (analytic Jacobian) LMDER1 Easy-to-use driver for LMDER LMDIF Solve nonlinear least squares problem (approximate Jacobian) LMDIF1 Easy-to-use driver for LMDIF LMPAR Determine Levenberg-Marquardt parameter LMSTR Solve nonlinear least squares problem (analytic Jacobian, storage conserving) LMSTR1 Easy-to-use driver for LMSTR QFORM Accumulate orthogonal matrix from QR factorization QRFAC Compute QR factorization of rectangular matrix QRSOLV Complete solution of least squares problem RWUPDT Update QR factorization after row addition R1MPYQ Apply orthogonal transformations from QR factorization R1UPDT Update QR factorization after rank-1 addition SPMPAR Provide single precision machine parametersIBM360,370 (designed to be machine-independent); FORTRAN IV; OS/360 (IBM360), OS/370 (IBM370); The test executions require from 92K to 158K bytes of storage.

22856 (ANL/NESC—896) TIDY-J; Fortran source code editing processor. Hightower, W.H. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048896.

Maxima of - 19 continuation cards 1000 unique statement numbers per subprogram.

TIDY-J is a utility program for processing FORTRAN source programs into a standard form which is easy to read and modify. In processing FORTRAN source statements it left-justifies statement labels and renumbers them to appear in increasing order, removes statement labels from unreferenced statements, deletes unreferenced FORMAT and unnumbered CONTINUE statements, deletes consecutive blank comment cards in excess of two, and inserts identification in columns 73-79. All statements, including comments, are aligned to begin in column 7. FORMAT statements are either collected at the end of the code, or optionally, left where they appear. Blank characters are inserted in statements and removed from them to improve readability. TIDY-J also provides a limited set of FORTRAN diagnostics on such errors as missing or duplicate statement numbers, asymmetric parentheses count, illegal DO-loop indexing, illegal statements, and inaccessible parts of the program. If the program contains a reference to non-existent statement numbers, TIDY-J generates pseudo statement numbers to replace these numbers in the referencing statements.IBM360,370,303x; FORTRAN IV; OS/MVT or OS/MVS; Two mass storage devices, logical units 8 and 9, are used for temporary storage. New "TIDYed" decks are punched on cards (logical unit 7). 150K bytes of memory are required for TIDY-J execution.

22857 (ANL/NESC—897) PL-MOD; fault tree analysis by modularization. Olmos, J.; Wolf, L. (Massachusetts Inst. of Tech., Cambridge (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048897.

PL-MOD is limited to steady-state occurrence probabilities. Only replicated gates representing a supercomponent event independent from all other gates in the tree may be treated.

PL-MOD performs an analysis of operating systems modeled by means of fault trees using modularization techniques. The program was developed to perform the modularization and evaluation of the modular occurrence probabilities and Vesely-Fussell importance measures for analysis of nuclear reactor safety system fault trees efficiently. It is capable of modularizing fault trees containing replicated components and replicated modular gates and can handle mutually exclusive inputs and explicit higher order symmetric (k-out-of-n) gates.IBM370,303x; PL/I; OS/VS1 (IBM370/168) and OS/MVT (IBM3033); 200K bytes of memory are required for execution.

22858 (ANL/NESC—905) GWCORE; GSPC 79 core graphics routines package. Wenner, P. (George Washington Univ., Washington, DC (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048905.

This package of FORTRAN callable subroutines is an implementation of the 1979 ACM SIGGRAPH core graphics specification. It is a machine-independent, device-independent output only (at this time) graphics language. It provides the primitives - lines, markers, polylines, polymarkers, polygons, moves, and text, as well as segmentation capabilities which permit many control functions such as visibility, highlighting, new frames, detectability, and image transformation. virtual size of application programs written with GWCORE is one-half million bytes. Integer*4 and real variables are also used so the system is not directly usable on 16-bit machines.

22859 (ANL/NESC—909) FC;LSEI;WNNLS; constrained least squares fit. Hanson, R.J. (Sandia National Labs., Albuquerque, NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048909.

Source decks (FC,LSEI,WNNLS 5572 cards, BLAS 726 cards) Sample driver (537 cards) Reference reports, SAND78-1290, SAND78-1291, and NESC Note.

FC allows a user to fit discrete data, in a weighted least-squares sense, using piece-wise polynomial functions represented by B-splines on a given set of knots. In addition to the least-squares fitting of the data, equality, inequality, and periodic constraints at a discrete, user-specified set of points can be imposed on the fitted curve or its derivatives. The subprograms LSEI and WNNLS solve the linearly-constrained least-squares problem. LSEI solves the class of problem with general inequality constraints, and, if requested, obtains a covariance matrix of the solution parameters. WNNLS solves the class of problem with nonnegativity constraints. It is anticipated that most users will find LSEI suitable for their needs; however, users with inequalities that are single bounds on variables may wish to use WNNLS.CDC6600,7600,CYBER175 (designed to be machine-independent); FORTRAN IV; NOS 1.4 (CDC6600), SCOPE 2.1 (CDC7600), NOS 1.3 (CDC CYBER175); 37,000 (octal) words of storage are needed to execute the sample driver that is provided. The storage required is a linear function of the number of data points plus a quadratic function of the number of piecewise polynomial coefficients. The code is edited output produced by the FORTRAN preprocessor, FLECS.

22860 (ANL/NESC—910) GRAIL; a device-independent graphics language. Brooking, J.A.; Schaller, N. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048910.

GRAIL is designed to be a graphical, device-independent, picture description system. GRAIL was designed to alleviate the software maintenance burden imposed by having several types of devices capable of generating graphical output under the control of applications programs. GRAIL is used through FORTRAN subroutine calls to describe a picture or set of pictures. These calls generate a GRAIL file which, when interpreted by post-processor programs, will generate pictures on any graphics device the user chooses.CDC6600,7600; FORTRAN IV (81%) and COMPASS (19%); NOS/BE 1.3 and SCOPE 3.2 (CDC6600), SCOPE 1.1 (CDC7600); The two GRAIL test programs require approximately 22,700 (octal) words for execution. The post-processor program, GRACAL, executes in approximately 30,100 (octal) words of central memory. GRAIL has been used in conjunction with CalComp, CDC280 COM, Versatec, and GOULD plotting devices.

22861 (ANL/NESC—912) MOCARS; mc distribution & simulation limits. Matthews, S.D.; Poloski, J.P. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048912.

Maxima of - 20 quantile values When calculating component importance, sampling distributions are assumed to be normal, lognormal, or exponential.

MOCARS uses Monte Carlo techniques to determine the distribution and simulation limits for a function. MOCARS randomly samples data from any of 12 different probability distributions and either evaluates a user-specified function or cut set system unavailability using the sample data. After ordering the data, the values at various quantities and associated confidence bounds are calculated. The available distributions are uniform, exponential, normal, binomial, Poisson, lognormal, Weibull, gamma, beta, Cauchy, Pearson Type IV, and empirical. If the cut set unavailability function is evaluated, MOCARS can determine the importance ranking for components in the unavailability calculation. Frequency and cumulative distribution histograms are also calculated from the sample data.CDC CYBER76;CDC7600; FORTRAN IV (76%) and COMPASS (24%); SCOPE 2.1; If a segmented load is performed, 15,000 (octal) words of memory are required for execution. Without segment loading additional memory will be needed.

22862 (ANL/NESC—913) LPMGB; linear programming subroutine with bounds. Hanson, R.J. (Sandia National Labs., Albuquerque, NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048913.

If the problem has M constraint equations in N variables, the extra storage, excluding data, is a linear function of M and N+(M*M) memory locations.

LPMGB minimizes a linear function of several variables subject to linear equality constraints with bounds on selected variables.CDC7600,CYBER175;IBM370,303x; FORTRAN; OS/370 (IBM370), SCOPE 2.1 (CDC7600), NOS 1.3 (CDC CYBER175); 27,000 (octal) words of memory are needed to execute the CDC7600 version with the test driver that is provided; the IBM370 version requires 120K bytes of memory.

22863 (ANL/NESC—916) UT200; DEC emulation of CDC 200 user terminal. Crow, V. (Pacific Northwest Lab., Richland, WA (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048916.

The UT200 program enables a properly configured DEC PDP-11 to be used as a remote job entry (RJE) terminal with CDC data processing equipment.DEC PDP-11; PAL PDP-11 assembly language; CAPS-11; 10K words of memory and the following input/output devices are needed: VT05, VT50, or VT52 CRT terminal, LP-11 line printer, CR-11 card reader, and DP-11 synchronous line interface. In addition, a TA-11 cassette unit, or alternative device, must be available to assemble and load the program.

22864 (ANL/NESC—918) LASO; block lanczos symmetric eigenvalue code. Scott, D.S. (Union Carbide Corp., Oak Ridge, TN (USA). Nuclear Div.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048918.

LASO is a package of subroutines developed for solving large sparse symmetric eigenvalue problems. There are two driver subroutines, one to determine a fixed number of eigenvalues and eigenvectors at one end of the spectrum of a large sparse symmetric matrix and the other to determine all the eigenvalues and eigenvectors of a large sparse symmetric matrix outside a user-defined excluded interval. Both are available in both single and double precision applicable to short word-length (32-bit) and longer word-length hardware.IBM360,370,303x (designed to be machine-independent); FORTRAN IV; OS/370 MVT and MVS; 500K bytes of memory are needed for compilation and 180K bytes are used for the double precision execution of the sample problem.

22865 (ANL/NESC—922) VMCON; nonlinearly constrained optimization. Hillstrom, K.E.; Minkoff, M. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048922.

VMCON minimizes a nonlinear function subject to nonlinear equality and inequality constraints.IBM370,303x; FORTRAN IV; OS/370; 95K bytes of memory are required to execute VMCON with the sample problems provided.

22866 (ANL/NESC—929) QLEVEL; potential bound & quasibound levels. Le Roy, R.J. (Waterloo Univ., Ontario (Canada)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048929.

Maxima of - 6010 mesh points 210 turning points 200 levels at which a solution is desired The potential used must be smooth or care must be taken at points where it has discontinuous derivatives.

QLEVEL solves the radial or one-dimensional Schroedinger equation for any given (smooth) potential to determine its eigenvalues, eigenfunctions, and the expectation values of various operators for any bound or quasibound levels (orbiting or shape resonances) of the given potential. The program can automatically generate the whole manifold of vibrational and rotational levels of a potential from a single initial trial eigenvalue, and can generate and use any one of a wide variety of analytic potentials or use a numerical potential defined by a set of user-supplied points.IBM370,303x; FORTRAN IV; OS/370; 350K bytes of memory are required to execute the program.

22867 (ANL/NESC—935) IDAP; interactive decision analysis procedure. Jusko, M.J.; Whitfield, R.G. (Argonne National Lab., IL (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048935.

The number of nodes in the user's decision tree is limited by the size of the main memory available. One node uses 94 bytes plus 4 bytes per attribute; a 1024-node 3-attribute tree requires an additional 106K bytes.

IDAP (Interactive Decision Analysis Procedure) is a program for creating, manipulating, and evaluating decision trees, which are representations of decision problems characterized by uncertain outcomes and multiple conflicting objectives. Capabilities of the program include: handling multiple decision nodes, including sequential decisions; handling discrete probability nodes with the number of branches virtually unlimited, so that a continuous probability function can be closely approximated; handling many attributes; accepting a wide variety of functional forms for marginal utility functions, including both discrete and continuous forms; treating multiattribute utility functions of either the additive or multiplicative form; calculating the expected utility for each decision alternative; identifying the optimal alternative, i.e. that which maximizes the expected utility; and performing sensitivity analyses by changing utility function parameters or attribute level tolls for nodes.IBM360,370,303x; PL/I; IBM OS/370 or IBM VM/370 under CMS; The program requires approximately 350K bytes of memory.

22868 (ANL/NESC—936) LCURVE; learning curve production calculations. Hatcher, B.L. (General Electric Co., St. Petersburg, FL (USA). Neutron Devices Dept.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048936.

LCURVE is a BASIC time-sharing computer program written to estimate the effort or dollars required to perform a task in a manufacturing process. The learning curve theory is that as quantities double, the rate of learning remains the same. For a 90 percent learning curve this means the second unit requires 90 percent of the hours needed to build the first unit, and the fourth unit requires 90 percent of the average hours needed to build the first two units. The percent learning curve to be used for the manufacturing process must be selected with care. If historical data are available, least squares analysis can be applied to determine the actual learning curve for a particular product and organization.Honeywell Series 60 Level 66 Model 20; BASIC; GCOS (Honeywell66/20), RT-11 (DEC LSI-11).

22869 (ANL/NESC—939) MAPPER; report-quality graphics on command. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; Penny, S.K. (Union Carbide Corp., Oak Ridge, TN (USA). Computer Sciences Div.). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048939.

Three-dimensional surfaces and mapping data bases are not included.

MAPPER is designed to provide a command language whereby non-programmers can produce report quality visual aids. The user can produce presentation and report quality slides, graphs, charts, tables, and maps in both color and black and white on 35mm film, Tektronix terminals, and Versatec and CalComp plotters. MAPPER can also be used to make 35mm and 16mm color or black and white movies. MAPPER can draw boxes, circles, ellipses, and complex line segments in a wide variety of line formats. There are six types of label commands and twelve lettering styles available to meet labeling requirements. Label options include manual sizing and location, two forms of automatic sizing and location, flexible string control, rotation, justification control, and multiple line capability. The user has a choice of color control and selective shading of specific areas. Symbols may be defined, positioned, scaled, distorted, and shaded as specified. Axes, curves, and error bars may be drawn. Additional features include user-defined logos, skipping, multilevel projection ports, contouring, three types of file subroutine usage, movie generating commands, and FORTRAN support capabilities.IBM360,370;DEC10; FORTRAN IV; OS/MVS (IBM360,370), TOPS 10 (DEC10); DISSPLA software is required along with appropriate film, plotter, and graphics input devices (e.g. CalComp 1036 and 1055 plotters, Versatec and Gould 5005 plotters, FR-80 film recorder, and Tektronix 4010-compatible terminals and Graphics Tablet), and 470K bytes of storage (IBM360,370) or 178 plus 15 pages of virtual memory (DEC10).

22870 (ANL/NESC—946) FLOCHT; computer drawn flow charts & diagrams. Fischer, S.K. (Oak Ridge National Lab., TN (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048946.

Both programs accept a maximum of 69 different instructions. .

FLOCHT is a combination of a DEC PDP10 computer program, FLOW1, and an IBM360 program, FLOW2, designed to produce publication quality flow charts and diagrams from a rough draft. Use of FLOCHT requires a minimum knowledge of the computer systems.DEC PDP10 with IBM360,370 or 303x; FORTRAN IV (99%), Assembly language (1%); OS/360 (FLOW2), TOPS-10 (FLOW1); 400K bytes of memory are required to execute the FLOW2 program.

22871 (CNEN-RT/EDP—82-1) Management and control of the IBM 370-168 system with the AG02 system. Litido, M.; Maioli, C.; Zini, C. (Comitato Nazionale per l'Energia Nucleare, Rome (Italy)). 1982. 72p. (In Italian). NTIS (US Sales Only). Order Number DE83900857.

A description is given of the characteristics and workload of the aforementioned computer center as well as an analysis of the components and function of the AG02 system. A tabular evaluation of the system's operation is given for the period May 18-June 5, 1981 at the Computer Center of the Italian National Nuclear Energy Commission. 8 references, 1 figure, 1 table.

22872 (CONF-820322—3) Computer program abstract as software documentation. Butler, M.K. (Argonne National Lab., IL (USA)). 1982. Contract W-31-109-ENG-38. 6p. NTIS, PC A02/MF A01. Order Number DE83007570.

From Federal information processing standards software documentation workshop; Washington, DC, USA (3 Mar 1982).

The computer program abstract, while not universally accepted as a form of software documentation, has long been recognized as a necessary reference document by the computer user community. Users have banded together in cooperative organizations with like computing environments, common disciplines, or a shared need for particular applications software, to promote the use of computer program abstracts as a means of publication, program exchange, and software development cost savings. Compilations of program abstracts have been adopted to describe the contents of computer program libraries and to market the software industry's products. In 1981, publication of an American National Standard for Computer Program Abstracts was approved, lending an air of respectability to the abstract's claim to a place in the software documentation family. This paper first seeks to define a computer program abstract and to point out its distinguishing features. Then, users and proponents of computer program abstracts are identified, and prior standardization efforts are reviewed, followed by a discussion of the development of the American National Standard.

22873 (CONF-820825—2) ANSI standard PL/I: an update. Dritz, K.W. (Argonne National Lab., IL (USA)). Aug 1982. Contract W-31-109-ENG-38. 27p. NTIS, PC A03/MF A01. Order Number DE83007962.

From SHARE 59 meeting; New Orleans, LA, USA (22 Aug 1982).

Activities, past and present, connected with the standardization of PL/I are surveyed in this talk. Noting implementations of full ANS PL/I (X3.53 to 1976), we begin with a review of the most significant differences between it and IBM PL/I. Some features and implementations of ANS General Purpose Subset PL/I (X3.74 to 1981) are covered next, and we also look briefly at the proposed extensions for real-time applications. Present activities of ANSC X3J1 towards revising full ANS PL/I are the final topic. Highlighted are features originating in the SHARE PL/I Project as well as proposals stemming from the author's own special interest, i.e., extensions to enhance the portability of mathematical software written in PL/I. The talk is an elaboration of numerous points presented on viewgraphs. The viewgraphs are reproduced here without benefit of elaboration; they are more or less self-explanatory.

22874 **(EUR—8034-EN) Documentation for the QMC generic LP modelling system. Final report.** Slee, P.V.; Williams, P.C. (Queen Mary Coll. Industrial Research Ltd., London (UK)). 1982. 176p. European Community Information Service, 2100 M Street, NW, Suite 707, Washington, DC 20037.

The documentation consists of five manuals: The BUILDER reference manual provides a general introduction to the system by means of descriptions and explanation of all available generic model building facilities. The Descriptive Manual provides a complete guide to the preparation of input data for BUILDER. The PRINTER Manual describes in detail the features of the PRINTER programs. The Computer System Use Manual gives advice on the compilation and execution of the Generic software. The Error Recovery Manual provides assistance in the interpretation of error messages produced by the system. Each manual consists of an introduction followed by a series of sections arranged in alphabetical order of subject. Where sections are common to more than one manual there is appropriate cross-referencing.

22875 **(LBL—15552) Max-IV disc cache.** Jacobson, V. (Lawrence Berkeley Lab., CA (USA)). Oct 1982. Contract AC03-76SF00098. 19p. NTIS, PC A02/MF A01. Order Number DE83008297.

This note describes some design considerations for routines to cache sectors of disc in main memory on a Modcomp-IV or Classic running Max-IV. Anyone who has used the Tools under Max-IV or has a real time system which does a lot of disc I/O (like the NBS system) is aware of the pathetic disc performance. The CPU utilization, even with 5 or 6 users, rarely exceeds 30% (limited by disc saturation). The idea of a cache is to use memory & CPU cycles to reduce the number of disc seeks.

22876 **(PB—82-217597) EFOM 12C software: general overview. Final report.** Jadot, P.; Fuchsova, J.; Vankelecom, E.; Van der Voort, E.; Thonet, C. (Commission of the European Communities, Luxembourg). 1981. 131p. (EUR—7391-EN). NTIS PC E06/MF E06.

The EFOM EC-12C software is described, produced by Systems-Europe during the first program of the CEC on energy modelling. This includes DAMOCLES, a specific data-base management system; SIMUL, a simulation program whose prime function is to check data consistency and issue warning messages when inconsistencies occur; and ORESTE-EDISON, a linear program matrix generator and report writer. The energy model, and the method of representing the energy system are briefly described. Appendix A defines the parameters needed to perform the case studies using the EFOM 12C software.

22877 **(SAND—83-0269C) DOBIS multiple data base support as implemented at Sandia National Laboratories Technical Library.** Kurtz, S.; Jones, D.T. (Sandia National Labs., Albuquerque, NM (USA); New Mexico Univ., Albuquerque (USA). Computing Center). 1983. Contract AC04-76DP00789. 90p. (CONF-830207—1). NTIS, PC A05/MF A01. Order Number DE83006206.

From DOBIS/LIBIS library system conference; Paris, France (17 Feb 1983).

Sandia National Laboratories leased the DOBIS-LIBIS library software from IBM in 1982 to provide computerized library services for the Sandia Albuquerque and Livermore Technical Librariies. Sandia made modifications to the software to expand the system's capabilities to allow use of multiple data files running under a single communication system. The enhancements have allowed Sandia to segretate their classified data from unclassified data and to restrict access to the classified data. The modifications have applicability for other users of the DOBIS sofrtware concerned with preserving the integrity of their private or classified information.

22878 **(UCID—19563-8) Electronics Engineering Department Computer Program Newsletter No. 8: image-processing computer codes.** Twogood, R.E.; Portnoff, M.R.; Sherwood, R.J. (Lawrence Livermore National Lab., CA (USA)). 3 Jan 1983. Contract W-7405-ENG-48. 40p. NTIS, PC A03/MF A01. Order Number DE83007768.

This newsletter presents an overview of the image processing computer capabilities that are available in the Electronics Engineering Department at LLNL. The computer programs discussed cover a wide range of operations, from simple image file formatting and manipulation to sophisticated image enhancement, 2-D transforms, and image filtering operations. This series of Computer Program Newsletters is published to inform the LLNL research community of the various software capabilities available in the Electronics Engineering Department.

22879 **(Y/DJ—25-016) Interactive control charts using SAS82.** Schlotzhauer, D.C. (Oak Ridge Y-12 Plant, TN (USA)). Jan 1983. Contract W-7405-ENG-26. 19p. (CONF-830125—1). NTIS, PC A02/MF A01. Order Number DE83007088.

From SAS users group international conference; New Orleans, LA, USA (16 Jan 1983).

American industry is under pressure to produce quality products. Statistical techniques, especially control charts, are becoming recognized as vital tools to this end, and the computer has greatly simplified their implementation by freeing people from the computations involved. This paper presents a program using SAS 82.1 and SAS/GRAPH making it possible to create x-bar and range charts in an interactive mode. In response to a series of prompts, the user provides information and makes various selections which tailor the resulting plot to his needs. For example, new control limits may be calculated at any point. Listed on the plot are runs-test statistics and out-of-limits points giving a complete analysis of the process on a single page. Also, since the new macro language is extensively used, the program serves as an example of its usefulness in SAS programming. Examples from the nuclear weapons industry will illustrate use of the program. Charts were established to help control the composition of material used in the manufacture of parts for these weapons.

22880 **Latin square three dimensional gage master.** Jones, L.L. (to Dept. of Energy). US Patent 4,364,182. 21 Dec 1982. Filed date 12 May 1981. vp.

PAT-APPL-262846.

A gage master for coordinate measuring machines has an nxn array of objects distributed in the Z coordinate utilizing the concept of a latin square experimental design. Using analysis of variance techniques, the invention may be used to identify sources of error in machine geometry and quantify machine accuracy.

22881 **Newton's method with a model trust region modification.** Sorensen, D.C. (Argonne National Lab., IL). *SIAM (Society for Industrial and Applied Mathematics) Journal on Numerical Analysis;* **19**: No. 2, 409-426(Apr 1982). Contract W-31-109-ENG-38.

A modified Newton method for unconstrained minimization is presented and analysed. The modification is based upon the model trust region approach. This report contains a thorough analysis of the locally constrained quadratic minimizations that arise as subproblems in the modified Newton iteration. Several promising alternatives are presented for solving these subproblems in ways that overcome certain theoretical difficulties exposed by this analysis. Very strong convergence results are presented concerning the minimization algorithm. In particular, the explicit use of second order information is justified by demonstrating that the iterates converge to a point which satisfies the second order necessary conditions for minimization. With the exception of very pathological cases this occurs whenever the algorithm is applied to problems with continuous second partial derivatives.

22882 **A_0-stable formulas of Adams type.** Feinberg, R.B. (Iowa State Univ., Ames). *SIAM (Society for Industrial and Applied Mathematics) Journal on Numerical Analysis;* **19**: No. 2, 259-262(Apr 1982).

This paper is concerned with the stability and accuracy of linear multistep formulas of Adams type. It is shown in particular that there are A_0-stable and k-step formulas of order k only for $k \leq 4$.

22883 Splines under tension for gridding three-dimensional data. Brand, H.R.; Frazer, J.W. (Lawrence Livermore National Lab., CA). *Analytical Chemistry;* **54**: No. 3, 414-416(Mar 1982). Contract W-7405-ENG-48.

By use of the splines-under-tension concept, a simple algorithm has been developed for the three-dimensional representation of nonuniformly spaced data. The representations provide useful information to the experimentalist when he is attempting to understand the results obtained in a self-adaptive experiment. The shortcomings of the algorithm are discussed as well as the advantages.

22884 (BG-Trans—5777) Description of criteria and testing methods for the hardware and software of microcomputer systems in applications relating to the safeguarding of systems in accordance with safety regulations. (British Gas Corp., London). Mar 1982. Translation source information not available . 16p. Dep. NTIS (US Sales Only), MF A01.

In technical safety relevant applications, microcomputer systems have to be designed so as to ensure the same degree of safety and reliability as is achieved by conventional engineering means. For this condition to be met, it is necessary to equip hardware and software parts of systems and equipment with verifiable self-testing routines and external testing equipment. Some of these methods are discussed. (GHT)

22885 VAL language: description and analysis. McGraw, J.R. (Lawrence Livermore National Lab., CA). *ACM Trans. Prog. Lang. Syst.;* **4**: No. 1, 44-82(Jan 1982). Contract W-7405-ENG-48.

VAL is a high-level, function-based language designed for use on data flow computers. A data flow computer has many small processors organized to cooperate in the executive of a single computation. A computation is represented by its data flow graph; each operator in a graph is scheduled for execution on one of the processors after all of its operands' values are known. VAL promotes the indentification of concurrency in algorithms and simplifies the mapping into data graphs. This paper presents a detailed introduction to VAL and analyzes its usefulness for programming in a highly concurrent environment. VAL provides implicit concurrency (operations that can execute simultaneously are evident without the need for any explicit language notation). The language uses function- and expression-based features that prohibit all side effects, which simplifies translation to graphs. The salient language features are described and illustrated through examples taken from a complete VAL program for adaptive quadrature. Analysis of the language shows that VAL meets the critical needs for a data flow environment. The language encourages programmers to think in terms of general concurrency, enhances readability (due to the absence of side effects), and possesses a structure amenable to verification techniques. However, VAL is still evolving. The language definition needs refining, and more support tools for programmer use need to be developed. Also, some new kinds of optimization problems should be addressed.

22886 Period doubling for trapezoid function iteration: metric theory. Beyer, W.A.; Stein, P.R. (Los Alamos National Lab., NM). *Adv. Appl. Math.;* **3**: 1-17(1982).

Iterations of a one-parameter family $F(\lambda,x) = \lambda f(x)$ of endomorphisms of [0,2] having the form of a trapezoid $f(x) = x/e$ for x belongs to [0,e], $f(x) = 1$ for x belongs to (e,2 - e) and $f(x) = (2 - x)/e$ for x belongs to [2 - e,2], are investigated. Here λ belongs to [1,2] and e belongs to (0,1). Let λ/sub n/ be the smallest value of $\lambda > 1$ for which $x = 1$ is a periodic point of period 2/sup n/. It is proved that for $e < 0.99$, λ/sub n/ - λ/sub n-1/ $\cong$ k(λ/sub ∞//e)/sup -2n/, where k is some constant and λ/sub ∞/ = lim/sub n$\rightarrow\infty$/λ/sub n/. The same conclusion probably holds for any $e < 1$. This behavior is substantially different from that found by Feigenbaum and others for the case where f(x) assumes its maximum value for a unique x. Numerical investigations are reported for functions related to the trapezoid function.

22887 Identification of noise in linear data sets by factor analysis. Roscoe, B.A.; Hopke, P.K. (Univ. of Illinois, Urbana). *Journal of Radioanalytical Chemistry;* **70**: No. 1-2, 483-495(1982). Contract AC02-80EV10403.

With the use of atomic and nuclear methods to analyze samples for a multitude of elements, very large data sets have been generated. Due to the ease of obtaining these results with computerized systems, the elemental data acquired are not always as thoroughly checked as they should be leading to some, if not many, bad data points. It is advantageous to have some feeling for the trouble spots in a data set before it is used for further studies. A technique which has the ability to identify bad data points, after the data has been generated, is classical factor analysis. The ability of classical factor analysis to identify two different types of data errors make it ideally suited for scanning large data sets. Since the results yielded by factor analysis indicate correlations between parameters, one must know something about the nature of the data set and the analytical techniques used to obtain it to confidentially isolate errors.

22888 Solving sparse symmetric definite quadratic λ-matrix problems. Scott, D.S. *Bit;* **21**: 475-480(1981). Contract W-7405-ENG-26.

This paper describes a method for computing all the eigenvalues in a user supplied interval [a,b], and their associated eigenvectors, of the symmetric definite quadratic λ-matrix problem $(M \lambda^2 + C \lambda + K)x = 0$, where the matrices are sufficiently sparse that methods based on similarity transformations are inappropriate. Only the triangular factorization of one n x n matrix need be computed.

9903 Information Handling

REFER ALSO TO CITATION(S) 22341

22889 (ANL/NESC—403R) TIGIR2; modular document information system. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy, J.H.; Zackrison, A.E. (Knolls Atomic Power Lab., Schenectady, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048403.

TIGIR2 is a modular program designed to generate and maintain libraries of document information (abstracts, bibliographic information, index terms, and other significant information), to retrieve the information selectively, to print the retrieved information in various output formats, and to generate statistics of the information files.CDC6600; FORTRAN and ASCENT; SCOPE.

22890 (ANL/NESC—856) ANSDDF; ANSI data description file utilities. Fowler, T.B.; Tobias, M.L.; Fox, J.N.; Lawler, B.E.; Koppel, J.U.; Triplett, J.R.; Lynn, L.L.; Waldman, L.A.; Goldberg, I.; Greebler, P.; Kelley, M.D.; Davis, R.A.; Keck, C.E.; Redfield, J.A.; Murphy,; McNeely, B.N. (Los Alamos National Lab., NM (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048856.

ANSDDF is an implementation of Level 1 of the draft proposed American National Standard Specification for an Information Interchange Data Description File. Level 1 is concerned only with unstructured alphanumeric data. The implementation, designed to provide the interface of the standard interchange format with the user system, is in the form of a user-callable multiple entry PL/I subprogram that performs the functions necessary for the creation and processing of the standard files. The implementation is for magnetic tape and the labels and block structures used are those defined for the spanned record option in ANSI X3.27-1977, Magnetic Tape Labels and File Structure for Information Interchange.IBM360,370,303x; PL/I; OS/360; 160K bytes of memory are needed for execution of both the ANSBLD and ANSLST procedures.

22891 **(ANL/NESC—915) CHECKER; CRECT; STNDRD; FIZCON; PSYCHE; RESEND; INTER; INTEND; SUMRIZ; PLOTEF; LSTFCV; RIGEL ENDF/B V5 processing codes; CHECKER, CRECT,.. AND ENDF/B V5 processing codes.** Dunford, C.L. (Brookhaven National Lab., Upton, NY (USA)). [nd]. vp. Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539. Order Number DE83048915.

Source decks (CHECKER 2583 cards, CRECT 262 cards, STNDRD 1200 cards, FIZCON 4817 cards, PSYCHE 5108 cards, RESEND 2911 cards, INTER 870 cards, INTEND 1581 cards, SUMRIZ 2220 cards, PLOTEF 6447 cards, LSTFCV 4106 cards, RIGEL 2226 cards) Reference report, BNL-50300, Memorandum, and NESC Note.

This collection of ENDF/B processing codes consists of twelve programs for processing ENDF/B (Evaluated Nuclear Data File Version B) Version-V data files. The programs perform the following functions: CHECKER checks ENDF/B data files for legal formats. CRECT corrects an ENDF/B BCD tape by inserting and deleting data. STNDRD standardizes ENDF/B data formats (removing E's in exponential format and inserting zeroes in control cards where necessary), resequences files, and creates or updates the dictionary for all materials. FIZCON checks ENDF/B data for physics consistency and to see that recommended procedures are followed. PSYCHE performs physics checks of ENDF/B data, calculates resonance integrals, checks secondary particle energy conservation, and performs reaction Q-value and Chart-of-the-Nuclides tests. RESEND generates infinitely dilute unbroadened point cross sections in the ENDF format by combining ENDF File 3 background cross sections with points calculated from File 2 resonance parameter data. INTER is a special version of the general-purpose ENDF integration program INTEND. INTEND is a general-purpose program which generates energy integrals from the ENDF/B cross section files using an arbitrary weight function and an arbitrary energy grid. SUMRIZ creates a summary for an ENDF material. A description and selection of useful data are written in each case. PLOTEF plots the ENDF/B data according to material number and file number from BCD input in standard, rather than alternate, format. LSTFCV produces interpreted listings of information from a BCD standard arrangement ENDF/B tape. RIGEL selectively or in toto retrieves ENDF/B data from one to nine ENDF/B tapes, merges the retrieved ENDF/B data onto from one to eight ENDF/B result tapes, changes the arrangement (standard to alternate or vice versa), and changes the mode (BCD to binary or vice versa).

22892 **(N—82-26029) Telemetry system for acquisition and recording of data: STAR.** Jeszensky, P.J.E. (Foundation for the Technical Development of Engineering, Sao Paulo (Brazil)). Jul 1981. 13p. (Portugese). NTIS, PC A12/MF A01.

In Instituto de Pesquisas Espaciais 1st Seminar on Use of the Natl. System for Collection of Satellite Data p 49-62 (SEE N82-26026 16-82).

Operation of the STAR telemetric data acquisition and recording system is described. The information flow through the network, the form of the messages, and the coding are described. A functional description of the elements of the network, including the ground station, is presented.

22893 **(UCRL—88735) Managing information for effective use: a case study.** Frobose, R.H. (Lawrence Livermore National Lab., CA (USA)). 14 Feb 1983. Contract W-7405-ENG-48. 7p. (CONF-830414—1). NTIS, PC A02/MF A01. Order Number DE83007345.

From 5. annual international conference on computer capacity management; New Orleans, LA, USA (18 Apr 1983).

An organization's information problems usually do not result from a lack of data but rather from the fact that the information is frequently in an inaccessible form. This paper describes a system which solves that problem by automatically handling the migration of the information that we gather about computer-center operations. It takes advantage of the fact that the inforamtion at various intermediate stages is amenable to different views and hence appropriate for answering different information requirements.

9904 Law

22894 **(KFK—3275) Technical risks and law.** Bluemel, W.; Wagner, H. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.); Hochschule fuer Verwaltungswissenschaften, Speyer (Germany, F.R.)). Nov 1981. 52p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83750181.

Course of lectures of Karlsruhe Research Centre and the University of Administrative Science, Speyer on May 18, 1981, June 1, 1981, June 22, 1981.

Using chemical and nuclear installations as examples, the five lectures attempt to bring the world of technology and the world of law closer together.

22895 (KFK—3275, pp 5-11) **Technical risks and Constitutional Law.** Benda, E. Nov 1981. (In German). Dep. NTIS (US Sales Only).

Course of lectures of Karlsruhe Nuclear Research Centre and University of Administrative Science, Speyer on May 18, 1981, June 1, 1981, June 22, 1981.

In Technical risks and law.

The author regards technical risk assessment as a legal problem of increasing importance. He discusses the delimitation of hazard, risk and damage; the protective duty of the state, and security of basic rights; the determination of risk elements; the interpretation of undetermined legal concepts. The essential question is as to what extent the undetermined legal concepts are subject to judicial reviews. A transition from 'subject-related' to 'procedural' reviewing requires corresponding insitutional and procedural rules according to which technical safety rules will be created. Under Constitutional Law, it does not seem to be satisfying to bind the courts to technical rules as long as there are none.

9905 Civilian Defense

REFER ALSO TO CITATION(S) 20728, 21660, 21661

22896 **(AD-A—119825/8) State-of-the-art assessment: shelter habitability. Final report Oct 81-Sep 82.** Wright, M.D.; Chessin, R.; Laney, M.; Cox, L. (Research Triangle Inst., Durham, NC (USA)). Sep 1982. 191p. (RTI—2265/00/04F). NTIS, PC A09/MF A01.

The objectives of this study were to assess the state-of-the-art of shelter habitability research, to describe nuclear weapons effects and mitigation techniques, to summarize current civil defense programs and policies, and to identify future research needs related to shelter habitability. The work consisted of an extensive review of civil defense literature, a review of non-civil defense literature through computer searches, and personnel communications with individual researchers. The information obtained was summarized into a state-of-the-art assessment of research related to shelter habitability. General conclusions were listed to identify areas where there is general agreement among researchers. Recommendations for further study were made for areas where there is disagreement among researchers and where there are important unanswered questions.

22897 **(AD-A—119914/0) Principles of warning and criteria governing eligibility of National Warning Systems (NAWAS) terminals.** (Federal Emergency Management Agency, Washington, DC (USA)). 9 Nov 1981. 18p. (CPG—1-14). NTIS, PC A02/MF A01.

The purpose of the guide is to provide civil defense and emergency management personnel with information concerning the basic principles of warning. The guide includes descriptions of the types of warning signals and their meaning, the Emergency Broadcast System (EBS), tests, exercise terms, basic steps in dissemination of warning, and criteria governing eligibility of National Warning System (NAWAS) terminals.

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Each entry under a corporate heading gives the document title and the volume and abstract numbers. The document type, e.g., R for Report; country of publication, e.g., US; and language of the document, e.g., In German; are given in parentheses at the end of the entry. If no language statement appears, the language is English. Tables of document types and country of publication codes appear after the indexes.

DOE Energy Information Data Base: Corporate Author Entries (DOE/TIC-4585) is used in the standardization of corporate entries. DOE/TIC-4585 is available for purchase from the National Technical Information Service (NTIS), U. S. Department of Commerce, Springfield, Virginia 22161.

A

Academia Sinica, Taipei (Taiwan). Inst. of Botany
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Acme Machinery Co., Huntington, WV (USA)
- Acme Miner Bolter: design, assembly, and field testing. Final technical report, September 30, 1979-March 31, 1982, 8:19609 (R;US)

Acurex Corp., Mountain View, CA (USA)
- Environmental assessment of stationary source Nox control technologies. Final report Jun 76-Sep 79, 8:20305 (R;US)

Acurex Corp., Mountain View, CA (USA). Alternate Energy Div.
- Photovoltaic concentrator application experiment. Final report, 8:20033 (R;US)

Acurex Corp., Mountain View, CA (USA). Energy and Environmental Div.
- Combustion modification controls for residential and commercial heating systems. Volume I: environmental assessment. Final task report Jun 78-Sep 79, 8:20921 (R;US)
- Combustion modification controls for residential and commercial heating systems. Volume II: oil-fired residential furnace field test. Final task report Jul 78-Jul 79, 8:20922 (R;US)
- Combustion modification controls for stationary gas turbine. Volume I: environmental assessment. Final report Feb 78-Jun 80, 8:21756 (R;US)
- Combustion modification controls for stationary gas turbines. Volume II: Utility unit field test. Final report Jul 78-Jul 79, 8:21757 (R;US)
- Combustion modification Nox controls for utility boilers. Volume I: tangential coal-fired unit field test. Final report Jul 78-Jul 79, 8:20293 (R;US)
- Combustion modification Nox controls for utility boilers. volume II: pulverized-coal wall-fired unit field test. Final report Jul 78-Jul 79, 8:20294 (R;US)
- Combustion modification Nox controls for utility boilers. Volume III: residual oil wall-fired unit field test. Final report Jul 78-Jul 79, 8:20295 (R;US)
- Industrial boiler combustion modification Nox controls. Volume I: environmental assessment. Final report Jan 78-Jul 79, 8:21460 (R;US)
- Industrial boiler combustion modification Nox controls. Volume II: stoker-coal-fired boiler field test - Site A. Final report Jul 78-Jul 79, 8:21461 (R;US)
- Industrial boiler combustion modification Nox controls. Volume III: stoker-coal-fired boiler field test - Site B. Final report Jul 78-Jul 79, 8:21462 (R;US)

Advanced Engineering Lab., Salisbury (Australia)
- Feasibility study on a low power vertical axis wind-powered generator, 8:20229 (R;AU)

Advisory Group for Aerospace Research and Development, 92 - Neuilly-sur-Seine (France)
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Aerodyne, Dallas, TX (USA)
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Aerospace Corp., El Segundo, CA (USA)
- Analysis of a series of solar flare x-ray spectra, 8:22068 (R;US)

Aerospace Corp., Los Angeles, CA (USA). Chemistry and Physics Lab.
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Ahmedabad Textile Industry's Research Association (India)
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Air Force Inst. of Tech., Wright-Patterson AFB, OH (USA). School of Engineering
- A two step method to treat variable winds in fallout smearing codes. Master's thesis, 8:21794 (R;US)
- A variational approach to the Rayleigh-Taylor instability of an accelerating plasma slab. Master's thesis, 8:22232 (R;US)
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Air Force Weapons Lab., Kirtland AFB, NM (USA)
- X-ray induced electron emission. Final report, 8:19977 (R;US)

Air Force Wright Aeronautical Labs., Wright-Patterson AFB, OH (USA)
- Potential for high temperature superconductivity. Final report Apr 80-Oct 81, 8:21148 (R;US)

Air Products and Chemicals, Inc., Allentown, PA (USA)
- Catalyst and reactor development for a liquid-phase Fischer-Tropsch process. Quarterly technical progress report, 1 July 1982-30 September 1982, 8:19933 (R;US)

Akron Univ., OH (USA). Dept. of Electrical Engineering
- High-efficiency residential fuel-cell energy systems. Final report, 8:20889 (R;US)

Alabama Univ., Huntsville (USA)
- Computing minimum cost fire protection, 8:21353 (R;US)

Alaska Power Authority, Anchorage (USA)
- Black Bear Lake project, FERC No. 5715 - Alaska. Draft Environmental Impact Statement, 8:19963 (R;US)

Alaska Univ., Fairbanks (USA)
- Kinetic response of ionospheric ions to onset of auroral electric fields, 8:22173 (R;US)

Alaska Univ., Fairbanks (USA). Mineral Industry Research Lab.
Characterization and evaluation of washability of Alaskan coal: selected seams from Northern Alaska, Chicago Creek, Unalakleet, Nenana, Matanuska, Beluga, Yentna, and Herendeen Bay coal fields. Final technical report for phase IV, August 1, 1980-January 31, 1982, 8:19615 (R;US)
Characterization and evaluation of washability of Alaskan coals: selected seams from the Northern Alaska, Nulato, Eagle, Nenana, Broad Pass, Kenai, Beluga, and Chignik coal fields. Final technical report for phase III, March 1979-January 31, 1982, 8:19616 (R;US)
AMAX Exploration, Inc., Golden, CO (USA)
McCoy Area, Nevada geothermal reservoir assessment case history - Northern Basin and Range. Final report, 1 October 1978-30 September 1982, 8:20154 (R;US)
AMC Cancer Research Center and Hospital, Lakewood, CO (USA)
Final progress report on carcinogenic agents, 8:21995 (R;US)
American Embassy, Ankara (Turkey)
The market for power generation equipment in Turkey (1982-1986). Foreign market survey report, 8:20844 (R;US)
American Petroleum Inst., Washington, DC
Vehicle refueling emissions seminar, 8:21823 (R;US)
Applied Concepts Corp., Woodstock, VA (USA)
Capitol Concrete Solar Industrial Process Heat Experiment. Final technical report, May 30-November 24, 1982, 8:20086 (R;US)
Applied Management Sciences, Inc., Silver Spring, MD (USA)
1980 Active-Solar Installations Survey, 8:20863 (R;US)
Development of standards and program packages. Volume III. Appendices. Final report, Phase 2, 8:20802 (R;US)
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A brief market study on electric power systems and energy conservation equipment in Thailand. Foreign market survey report (final), 8:20843 (R;US)
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ARCO Solar final report: fabrication of a prototype system for residences in the Southwest, 8:20038 (R;US)
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Two-electron gates in photosynthesis, 8:21264 (R;US)
Two-fluid model and importance of the interfacial area in two-phase flow analysis, 8:21421 (R;US)
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Urban air-quality impacts of district-heating development, 8:20996 (R;US)
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Void formation and solute segregation in ion-irradiated niobium-base alloys, 8:21055 (R;US)
Volatile fission-product source term evaluation using the fastgrass comptuer code, 8:20681 (R;US)
VUV spectroscopy of rare gas van der Waals dimers, 8:22181 (R;US)
WSP-HASP/DOS; DOS-MFT remote workstation package, 8:22843 (R;US)

Arizona Energy Office, Phoenix (USA)
Handbook on solar energy and energy conservation for Arizona local governments, 8:21008 (R;US)

Arizona State Univ., Tempe (USA). Dept. of Electrical and Computer Engineering
Probabilistic approach to stability analysis. Volume 1. Mathematical models, computing methods, and results. Final report, 8:20612 (R;US)

Arizona Univ., Tucson (USA)
Electrostatic technology for control of dust and hydrocarbon vapors in high power laser systems. Final report, 8:21374 (R;US)
Solar diameter measurements for study of sun climate coupling. Final report, June 1980-May 1981, 8:22135 (R;US)
Superconductivity in artificial Nb/Cu heterostructures, 8:21052 (R;US)

Arizona Univ., Tucson (USA). Dept. of Chemical Engineering
Change in catalyst activity during catalytic steam gasification of char. First quarterly report, 8:19517 (R;US)

Arizona Univ., Tucson (USA). Dept. of Mining and Geological Engineering
Probabilistic endowment appraisal system based upon the formalization of geologic decisions. National Uranium Resource Evaluation. Final report: demonstration and comparative analysis of estimates and methods, 8:19795 (R;US)

Arizona Univ., Tucson (USA). Dept. of Nuclear Engineering
Thermodynamic properties of water for computer simulation of power plants, 8:20273 (R;US)

Arkansas State Univ., State University (USA). Dept. of Chemistry
Vaporization thermodynamics of K_2S and K_2SO_3, 8:20877 (R;US)

Armed Forces Radiobiology Research Inst., Bethesda, MD (USA)
Behavioral studies following ionizing radiation exposures: a data base. Technical report, 8:21937 (R;US)

Army Armament Research and Development Command, Aberdeen Proving Ground, MD (USA). Ballistics Research Lab.
Application of CARS to obtain temperature in flame environments. Final report, 8:19773 (R;US)
Temperature profile of a stoichiometric ch4/N2O flame from laser excited fluorescence measurements on OH, 8:21294 (R;US)

Army Armament Research and Development Command, Dover, NJ (USA). Large Caliber Weapon Systems Lab.
Solar energy applications at Army Ammunition Plants. Technical report, 8:20079 (R;US)

Army Construction Engineering Research Lab., Champaign, IL (USA)
Validation data for mechanical system algorithms used in building energy analysis programs. Final report, 8:20891 (R;US)

Army Engineer Waterways Experiment Station, Vicksburg, MS (USA)
Parameters for characterizing sites for disposal of low-level radioactive waste. Technical report, 8:19856 (R;US)

Army Engineer Waterways Experiment Station, Vicksburg, MS (USA). Structures Lab.

Grout formulations for nuclear waste isolation. Final report, 8:19817 (R;US)

Army Mobility Equipment Research and Development Center, Fort Belvoir, VA (USA)

Baseline and verification tests of the Unique Mobility, Inc. Electrek 2+2. Final test report 8 Aug 80-29 May 81, 8:21023 (R;US)

Verification test of the Battronic Truck Volta Electric Pickup. Report for Jul 80-Jan 81, 8:21024 (R;US)

Verification tests of the U.S. Electricar Corporation Lectric Leopard. Technical report 3 Aug-25 Sep 81, 8:21025 (R;US)

Army Nuclear and Chemical Agency, Springfield, VA (USA)

Nuclear weapons effects mitigation techniques, 8:21662 (R;US)

Army Pulse Radiation Facility, Aberdeen Proving Ground, MD (USA)

APRFX1; 99-group DLC-2B library group-collapsing, 8:20530 (R;US)

Arvin Calspan, Buffalo, NY (USA). Applied Technology Group

Mitigation of biofouling using coatings, year 3. Quarterly progress report No. 1, 8:20255 (R;US)

Ashland Synthetic Fuels, Inc., KY (USA)

H-Coal Pilot Plant: radiation safety, 8:19428 (R;US)

H-Coal Pilot Plant: surface- and ground-water monitoring program for H-Coal solid-waste storage and disposal site, E and H-11, 8:19596 (R;US)

H-Coal Pilot Plant: worker health-protection training program at the H-Coal Pilot Plant, E and H-3, 8:19427 (R;US)

Atomic Energy of Canada Ltd., Chalk River, Ontario. Chalk River Nuclear Labs.

FORSIM; solution of partial or ordinary differential equations, 8:22838 (R;US)

Atomics International, Canoga Park, CA (USA)

AILMOE; cross section calculation of elastic scattering resonancess, 8:22428 (R;US)

AIROS2A; simulation of reactor dynamics, 8:20513 (R;US)

AISITE2; parametric site requirement study, 8:20622 (R;US)

CAESAR4; liblst; one-dimensional, multigroup diffusion, 8:22441 (R;US)

CLIP; form or thredes library utility routine, 8:22442 (R;US)

HWOCR-SAFE; two-dimensional Monte Carlo cell calculation, 8:20507 (R;US)

SIZZLE; one-dimensional multigroup diffusion depletion, 8:22426 (R;US)

THREDES; one-dimensional few group diffusion design system, 8:20501 (R;US)

TSN; spatially-dependent reactor kinetics, 8:20508 (R;US)

Atomics International Div., Canoga Park, CA (USA)

COMNUC;CASCADE; compound nucleus reaction, 8:22366 (R;US)

FIGS; IBM360 and 2250 FORTRAN graphics subroutines, 8:22836 (R;US)

HAA3B; aerosol behavior lognormal model, 8:20653 (R;US)

PSA2; stress analysis multianchor pipe system, 8:20571 (R;US)

SCORE3; SCISRS ENDF/B graphic cross section evaluation, 8:22473 (R;US)

VIM1;VIM1X; Monte Carlo critical assembly analysis, 8:20634 (R;US)

Auburn Univ., AL (USA). Dept. of Physics

Theory of rf heating of toroidal plasmas, 8:22601 (R;US)

Austin Research Associates, Inc., TX (USA)

Quarterly technical status report, December 1, 1982-February 28, 1983, 8:22600 (R;US)

Australian Coal Industry Research Labs. Ltd., North Ryde

Design and commissioning of a 2 to 5 kg/h continuous reactor unit (CRU Mark II), 8:19400 (R;AU)

Development of a laboratory corona apparatus. Part 1, 8:19574 (R;AU)

Examination of the mineral components of coal and its resultant fly ash in relation to resistivity characteristics of the fly ash, 8:19543 (R;AU)

Avco/Lycoming, Stratford, CT (USA)

Development of improved high temperature coatings for In-792 + Hf. Final report, 8:21081 (R;US)

B

Babcock and Wilcox Co., Lynchburg, VA (USA)

Development of a reactor-coolant-pump monitoring and diagnostic system. Semi-annual progress report, December 1981-May 1982, 8:20354 (R;US)

Badenwerk A.G., Karlsruhe (Germany, F.R.)

Energy supplies and energy conservation. Pt.2, 8:20845 (R;DE;In German)

Badische Gas- und Elektrizitaetsversorgung A.G., Loerrach (Germany, F.R.)

Report of the business year 1980 from 1st January until 31st December 1980, 8:20811 (R;DE;In German)

Barton-Aschman Associates, Inc., Evanston, IL (USA)

Energy-conservation strategies and their effects on travel demand, 8:20947 (R;US)

Battelle Columbus Labs., OH (USA)

ADEP; 1-dimensional and 2-dimensional few-group space-time kinetics, 8:20539 (R;US)

ECCSA4; loss-of-coolant & emergency cooling, 8:20566 (R;US)

Environmental assessment of coal cleaning processes. Final report Jul 76-Sep 79, 8:19600 (R;US)

Evaluation of advanced materials. Final report, 8:21124 (R;US)

FRCRL2; LOCA fission product release analysis, 8:20657 (R;US)

MIRAB;MIRAP; containment system iodine removal, 8:20656 (R;US)

MUCHA1;MUCHA2; multiple channel analysis emergency core cooling, 8:20658 (R;US)

NURLOC-1.0; loss-of-coolant thermal analysis, 8:20319 (R;US)

Research options for the development of sensors to measure the thermal state of solid steel bodies. Draft final report, 8:20989 (R;US)

User's guide to SOLREL: a simulation of reliability and availability of photovoltaic systems, 8:20047 (R;US)

Battelle Human Affairs Research Center, Seattle, WA (USA)

Engineering expertise on shift in nuclear power plants: the foreign experience, 8:20316 (R;US)

Battelle-Institut e.V., Frankfurt am Main (Germany, F.R.)

Development of a cadmium selenide thin film solar cell. Final report, Mar. 1980, 8:19981 (R;DE;In several languages)

Battelle Memorial Inst., Columbus, OH (USA). Office of National Waste Terminal Storage Integration

Projected costs for mined geologic repositories for dispoal of commercial nuclear wastes, 8:19857 (R;US)

Battelle Memorial Inst., Columbus, OH (USA). Office of Nuclear Waste Isolation

Technical progress report for the quarter, 1 April-30 June 1982, 8:19858 (R;US)

Battelle Pacific Northwest Labs., Richland, WA (USA)

Dosimetric and behavioral analysis of microwave-drug synergistic effects on operant behavior in the rat. Final report Sep 79-Dec 81, 8:22022 (R;US)

BCS Richland, Inc., WA (USA)

TIDY3;TIDY4; utility to edit fortran source programs, 8:22845 (R;US)

BDM Corp., Albuquerque, NM (USA)

Verification of cryogenic blowout control technology for offshore wells. Final report, 8:19689 (R;US)

Bechtel Corp., San Francisco, CA (USA)

Dual alkali acceptance test at Louisville Gas and Electric Company; Volume I. Acceptance test and appendices A-C. Final report Apr 79-Jul 80, 8:20298 (R;US)

Dual alkali acceptance test at Louisville Gas and Electric Company; Volume II. Appendices D-F. Final report Apr 79-Jul 80, 8:20299 (R;US)

Dual alkali acceptance test at Louisville Gas and Electric Company; Volume III. Appendices G-J. Final report Apr 79-Jul 80, 8:20300 (R;US)

FOG; one-dimensional few-group few-gp diffusion slab cylinder sphere, 8:22420 (R;US)

Bechtel Group, Inc., San Francisco, CA (USA)

Modular HTGR systems design and cost summary, 8:20480 (R;US)

Monolithic HTGR - reformer design and cost summary: thermochemical pipeline application, 8:20479 (R;US)

Preliminary evaluation of the Avco-Ebara FGT process. Final report, 8:19589 (R;US)

Bendix Corp., Baltimore, MD (USA). Environmental and Process Instruments Div.
Coal mine dust personal sampler (CMDPS). Final report, 8:19660 (R;US)

Bendix Corp., Cocoa Beach, FL (USA). Launch Support Div.
Assessing safety in fossil fueled electric power generating plants. Final report, 8:20281 (R;US)

Bendix Corp., Kansas City, MO (USA)
Nontoxic polyimides. Final report, 8:21155 (R;US)

Bendix Field Engineering Corp., Grand Junction, CO (USA)
Assessment of uranium potential for the NURE quadrangle evaluation program: the elicitation procedure. National Uranium Resource Evaluation, 8:19789 (R;US)
Computer-modeling codes to improve exploration nuclear-logging methods. National Uranium Resource Evaluation, 8:19790 (R;US)
Probabilistic endowment appraisal system based upon the formalization of geologic decisions. National Uranium Resource Evaluation. Final report: demonstration and comparative analysis of estimates and methods, 8:19795 (R;US)
Uranium hydrogeochemical and stream sediment reconnaissance of the Beaver NTMS quadrangle, Alaska. National Uranium Resource Evaluation, 8:19792 (R;US)
Uranium hydrogeochemical and stream sediment reconnaissance of the Sterling NTMS quadrangle, Colorado. National Uranium Resource Evaluation, 8:19793 (R;US)
Uranium hydrogeochemical and stream sediment reconnaissance of the Ketchikan NTMS quadrangle, Alaska. National Uranium Resource Evaluation, 8:19794 (R;US)

Bendix Field Engineering Corp., Grand Junction, CO (USA). Grand Junction Operations
Application of NURE data to the study of crystalline rocks in the Wyoming uranium province, 8:19791 (R;US)

Bend Research, Inc., OR (USA)
Membrane separation technology in the 1980's. ECUT: Energy Conversion and Utilization Technology Program. Biocatalysis research activity. Final report, 8:20971 (R;US)

BENMOL Corp., Alexandria, VA (USA)
Alexandria fluidized-bed process-development unit. Hot-mode testing , 8:20256 (R;US)

Bergen Univ. (Norway)
Oil spill identification by chemical analysis, 8:19727 (R;NO)

Big Green Investments, Denver, CO (USA)
Solar heating system for office/warehouse buildings: piping and ductwork drawings (Engineering Materials), 8:20118 (E;US)

Birmingham Univ. (UK)
Particle acceleration in solar flares, 8:22105 (R;FR)

Boeing Co., Huntsville, AL (USA). Boeing Huntsville Simulation Center
FAIMOS; one-dimensional, multigroup diffusion in slab, cylindrical, or spherical geometries , 8:22427 (R;US)
PERT; one-dimensional perturbation for AIM and FOG codes, 8:22422 (R;US)
TEMPEST2; thermal neutron spectrum cross sections, 8:22424 (R;US)

Boeing Co., Seattle, WA (USA)
Design, fabrication and test of graphite/polyimide composite joints and attachments for advanced aerospace vehicles, 8:21138 (R;US)
Selected advanced aerodynamic and active control concepts development, 8:20951 (R;US)

Boeing Engineering and Construction, Tukwila, WA (USA)
Pacific Bulk commodity Transportation System, phase III. Volume IV: marad/Boeing study. Final report, 8:19624 (R;US)

Bonn Univ. (Germany, F.R.). Landwirtschaftliche Fakultaet
Heat pumps for air conditioning in animal shelters and for heating of buildings, 8:20974 (R;DE;In German)

Boston Univ., MA (USA)
Infrared-absorption spectrum of free carriers in polar semiconductors. Progress report, July 1, 1982-June 30, 1983, 8:21160 (R;US)

Boston Univ., MA (USA). Dept. of Chemistry
Formation of fuel via photochemical electron transfer. Progress report, February 1, 1982-January 31, 1983, 8:21266 (R;US)

Boston Univ., MA (USA). Dept. of Physics
Dispersion of the refractive index near the absorption edge in compound semiconductors, 8:21161 (R;US)

Boyce Thompson Inst. for Plant Research, Ithaca, NY (USA)
Carbon metabolism in legume nodules. Progress report, June 1, 1982-January 30, 1983, 8:21910 (R;US)

Brigham Young Univ., Provo, UT (USA). Dept. of Chemical Engineering
Combustion research needs, 8:21301 (R;US)

Brigham Young Univ., Provo, UT (USA). Dept. of Chemistry
Separation of asphaltenes using high-resolution supercritical-fluid chromatography. Progress report, December 1, 1982-February 28, 1983, 8:19561 (R;US)

British Gas Corp., London
Description of criteria and testing methods for the hardware and software of microcomputer systems in applications relating to the safeguarding of systems in accordance with safety regulations, 8:22884 (TG;GB)

British Library, Boston Spa. Lending Div.
Process for the removal of oxides of nitrogen and the aqueous solution used, 8:21193 (R;US)

Brookhaven National Lab., Upton, NY (USA)
An e-p primer, 8:22249 (R;US)
Antiproton-nucleus interactions, 8:22367 (R;US)
AVERAGE; unresolved region average cross section calculations, 8:22474 (R;US)
BESFIT; diffraction model elastic scattering cross sections, 8:22176 (R;US)
Buoyancy-induced flow studies in thermally stratified loop of a double-envelope building, 8:20894 (R;US)
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CHECKER;CRECT;STNDRD;FIZCON; PSYCHE;RESEND;INTER;INTEND;SUMRIZ;PLOTEF;LSTFCV;RIGE ENDF/B V5 processing codes; CHECKER,CRECT,.. AND ENDF/B V5 processing codes, 8:22891 (R;US)
Coal-oil mixtures: an alternative fuel for the commercial sector. Annual report, fiscal year 1981, 8:19627 (R;US)
CRECT;CHECKER;RIGEL;PLOTFB; LISTFC;DICTION;SLAVE3;DAMMET ENDF/B V2 processing codes, 8:22349 (R;US)
Data-acquisition system for environmental monitoring aboard a twin-engined aircraft, 8:21689 (R;US)
Effects of magnetic non-linearities on a stored proton beam and their implications for superconducting storage rings, 8:21485 (R;US)
eP physics at the CBA, 8:22251 (R;US)
Examination of failed studs from No. 2 steam generator at the Maine Yankee Nuclear Power Station, 8:20382 (R;US)
Facility for in-vivo measurement of lithium, 8:21896 (R;US)
Higher-order modes calculation of rf cavity with cylindrical symmetry, 8:21484 (R;US)
Improved four-stage accel-decel production of low-energy stripped heavy ions, 8:21499 (R;US)
Laser-driven grating linac, 8:21472 (R;US)
NOAH; one-dimensional, one-group space-time diffusion feedback, 8:22485 (R;US)
RAMP1; Reich-Moore resolved region cross-sections, 8:22503 (R;US)
RESEND;ADLER; ENDF/B resonance cross section codes, 8:20529 (R;US)
Review of Panel on Reference Nuclear Data surveys and discussions on reference nuclear data needs, 8:22342 (R;US)
Review of the Limerick Generating Station Probabilistic Risk Assessment, 8:20721 (R;US)
SIGPLOT; resolved multilevel Briet-Wigner cross section calculations, 8:22475 (R;US)
Status reports on ISABELLE magnets, 8:21500 (R;US)
Structural maps and parameters important to alloy phase stability, 8:21040 (R;US)
THRES2; statistical model reaction cross-sections, 8:22355 (R;US)
Waste-Form Development Program. Annual progress report, October 1981-September 1982, 8:19818 (R;US)

Brooklyn Coll., NY (USA). Dept. of Physics
Optical and electrochemical investigation of ruthenium and iridium and their oxides in relation to their electrocatalytic activity. Progress report, 8:21122 (R;US)

Brown, Boveri und Cie A.G., Heidelberg (Germany, F.R.). Zentrales Forschungslabor
Exhaust sensor for heating systems, 8:20939 (TG;US)

Brown Univ., Providence, RI (USA). Div. of Engineering
Characterization of tar products from rapid pyrolysis of bituminous coals. Fifth quarterly progress report, October 1982-December 1982, 8:19560 (R;US)

Budd Co., Fort Washington, PA (USA). Technical Center
Design and evaluation of low-cost stainless steel - fiberglass-foam blades for large wind-driven generating systems, 8:20211 (R;US)
Development and fabrication of solar-collector SMC reflector assemblies, 8:20133 (R;US)

Bundesministerium fuer Wirtschaft, Bonn (Germany, F.R.)
Electric power supply in the Federal Republic of Germany - August 1981, 8:20846 (R;DE;In German)
Electric power supply in the Federal Republic of Germany - February 1982, 8:20847 (R;DE;In German)
Electric power supply in the Federal Republic of Germany in the year 1981, 8:20848 (R;DE;In German)

Bureau Energie Onderzoek Projecten, Patten (Netherlands)
Building licenses for wind turbines. Preliminary directives and case studies, 8:20210 (R;NL;In Dutch)
Solar energy in the Netherlands. Program of the second phase of the National Research Program on Solar Energy (1982-1985), 8:19964 (R;NL;In Dutch)

Bureau of Mines, Albany, OR (USA). Albany Research Center
Introduction of sulfur into copper converter slags to produce copper matte. Report of investigations/1982, 8:20986 (R;US)

Bureau of Mines, Avondale, MD (USA). Avondale Research Center
The solubility of methane, carbon dioxide, and oxygen in brines from 0 deg to 300 deg c. Report of investigations/1982, 8:20200 (R;US)

Bureau of Mines, Denver, CO (USA). Intermountain Field Operation Center
Preliminary testing of a prototype portable x-ray fluorescence spectrometer. Information circular, 8:21586 (R;US)

Bureau of Mines, Pittsburgh, PA (USA). Energy Research Center
Design of heat-recovery and seed-recovery units in MHD power generation, 8:20878 (R;US)
MHD combustor designs and materials of construction, 8:20879 (R;US)

Bureau of Mines, Reno, NV (USA). Reno Research Center
Operation of a mineral recovery unit on brine from the Salton Sea Known Geothermal Resource Area. Report of investigations/1982, 8:20167 (R;US)

Bureau of Mines, Tuscaloosa, AL (USA). Tuscaloosa Research Center
Refractory properties of brick produced from beneficiated chrome-containing furnace linings. Report of investigations/1982, 8:20983 (R;US)

Bureau of Mines, Washington, DC (USA)
Bureau of Mines, oil shale data bank. Part 1 - bibliography: Volume 2, 8:19776 (R;US)
Bureau of Mines oil shale data bank. Part III. Recent research projects, 8:19777 (R;US)
Bureau of Mines oil-shale data bank. Part I. Bibliography. Volume 1, 8:19775 (R;US)
Bureau of Mines oil-shale data bank. Part II. Patents, 8:19778 (R;US)

Bureau of Mines, Washington, DC (USA). Div. of Education and Training Services
Haulage accident prevention, 8:19659 (R;US)

Bureau of Reclamation, Denver, CO (USA). Engineering and Research Center
Characterization of LaVerkin Springs water and methods for its reuse in energy development, 8:21881 (R;US)

Bureau of the Census, Washington, DC (USA)
Annual housing survey: 1979. United States and regions. part f: energy-related housing characteristics, 8:20934 (R;US)

Burns and Roe, Inc., Woodbury, NY (USA)
MHD oxidant intermediate temperature ceramic heater study. Final report, 8:20882 (R;US)

Burns and Roe Services Corp., Oradell, NJ (USA)
Alexandria fluidized-bed process-development unit. Hot-mode testing , 8:20256 (R;US)

C

California Energy Resources Conservation and Development Commission, Sacramento (USA)
California energy prices, 1980-2000. Staff report (final), 8:19718 (R;US)
Delivering energy services: new challenges for California's electric utilities, 8:20853 (R;US)
Economic assessment of residential retrofit electricity conservation measures: consumer and utility perspectives. Staff report, 8:20920 (R;US)
Export restrictions on domestic oil: a California perspective, 8:19717 (R;US)
Securing California's energy future. Draft 1983 biennial report to the Governor and the Legislature, 8:20795 (R;US)

California Energy Resources Conservation and Development Commission, Sacramento (USA). Conservation Div.
1981/82 nonresidential building standards development project: use of computerized graphics to optimize building energy use in predesign and programing, 8:20915 (R;US)

California Inst. of Tech., Pasadena (USA)
First results from DELCO at PEP, 8:22270 (R;US)
Interferometric observations of solar flare precursors at 10.6 ghz. Final report oct 80-jan 82, 8:22071 (R;US)
QCD Monte-Carlo models for $e^+ e^-$ annihilations and hadron-hadron collisions, 8:22283 (R;US)
Report for 1979-1980, 1980-1981 of the Division of Engineering and Applied Science at the California Institute of Technology, 8:21303 (R;US)

California Univ., Berkeley (USA)
Carbon balance of world forests and their associated soils. Progress report, August 1, 1977-September 30, 1978, 8:21826 (R;US)
Damage and in-situ annealing during ion implantation, 8:21075 (R;US)
Definition study for an advanced cosmic ray experiment utilizing the long duration exposure facility. Final report, 17 July 1980-30 September 1981, 8:22134 (R;US)
Long-duration thermal storage for solar-thermal high-pressure steam IPH, 8:20103 (R;US)

California Univ., Berkeley (USA). Dept. of Materials Science and Mineral Engineering
New class of steels for thick-wall pressure vessels. Final technical report, June 21, 1980-June 30, 1982, 8:21088 (R;US)

California Univ., Davis (USA). Dept. of Mechanical Engineering
Computer simulation of concrete penetration by shaped-charge jets, 8:21656 (R;US)
Numerical methods and calculations for droplet flow, heating and ignition, 8:21297 (R;US)

California Univ., Los Angeles (USA)
Conversion of shale and slate wastes to glass and glass-ceramic products. Open file report 20 Oct 76-19 Sep 79, 8:20980 (R;US)
Development of substitutes for asbestos. Open file report 28 Sep 79-1 Apr 81, 8:20981 (R;US)

California Univ., Los Angeles (USA). Dept. of Electrical Engineering
Wavelength scaling of the two-plasmon decay and stimulated Raman-scattering instabilities. Annual progress report, September 10, 1981-September 9, 1982, 8:22703 (R;US)

California Univ., San Diego (USA)
Hard x-ray astrophysics, 8:22125 (R;US)
Spectroscopy in the 10 kev to 10 mev range, 8:22123 (R;US)

California Univ., Santa Barbara (USA)
Some natural zeolites: recent thermodynamic results, their application, and the estimation of missing thermodynamic quantities, 8:20194 (R;US)

California Univ., Santa Barbara (USA). Community and Organization Research Inst.
Cross-subsidization and competition: a case study of gas and electric utility involvement in residential energy conservation. Final report, 8:20919 (R;US)

California Univ., Santa Barbara (USA). Quantum Inst.
Design of the UCSB FEL electron beam system, 8:21377 (R;US)
The UCSB free electron laser experimental program, 8:21376 (R;US)
Theory of pulse propagation and coherence in free electron lasers. Annual scientific report, 8:21372 (R;US)

- Three dimensional radiation fields in free electron lasers using Lienard-Wiechert fields, 8:21378 (R;US)

Calspan Corp., Buffalo, NY (USA)
- Aerial measurement of heat loss: Phase II, 8:20914 (R;US)
- Determination of effects of ambient conditions on aircraft engine emissions: data analysis and correction factor generation, 8:21760 (R;US)

Cambridge Univ. (UK). Dept. of Engineering
- Two hypothetical problems in radioactive waste management: a comparison of cost/benefit analysis and decision analysis, 8:19861 (R;US)

Carnegie-Mellon Univ., Pittsburgh, PA (USA)
- Experimental medium-energy physics at Carnegie-Mellon University, 1968-1983, 8:22252 (R;US)

Carnegie-Mellon Univ., Pittsburgh, PA (USA). Rail Systems Center
- Energy cost reduction study of the Washington Metropolitan Area Transit Authority metrorail system. volume 1: final report, 8:20958 (R;US)
- Energy cost reduction study of the Washington Metropolitan Area Transit Authority metrorail system. volume 2: appendices. Final report, 8:20959 (R;US)

CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France). Dept. of Chemistry
- Contribution to the study of the behavior of fission-product niobium during the reprocessing of spent nuclear fuel, 8:19806 (TG;US)

CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)
- Antiproton-nucleus interactions, 8:22367 (R;US)
- Construction of a 100 kW solar thermal-electric experimental plant, 8:20054 (R;FR)

Central Building Research Inst., Roorkee (India)
- Building digest - general building aspects, 8:20928 (R;US)
- Building digests: cooling of buildings, 8:20926 (R;US)
- Building digests: heating and thermal aspects of building, 8:20924 (R;US)
- For building and construction. Technical notes, 8:20925 (R;US)

Central Intelligence Agency, Washington, DC (USA)
- Maps: Poland, Eastern Europe: major power facilities, 8:21848 (R;US)

Central Soya Co., Inc., Fort Wayne, IN (USA)
- Fluidized-bed boiler: an industrial application at Central Soya Company, Inc., Marion, Ohio, 8:19631 (R;US)

Central Washington Univ., Ellensburg (USA)
- Acid precipitation in the washington cascades: phase i. Report for 1 Oct 80-30 Sep 81, 8:21754 (R;US)

Centre National de la Recherche Scientifique, 75 - Paris (France)
- Investigation on atmospheric h and d through the measurement of their lyman-alpha emissions, 8:21682 (R;US)
- Solar spectrum from 170 to 3200 nanometers, 8:22083 (R;US)

Centre National de la Recherche Scientifique, 75 - Paris (France). Inst. d'Astrophysique
- Recent developments in solar flare models, 8:22107 (R;US;FR)

Centre National d'Etudes Spatiales, 31 - Toulouse (France)
- Modal analysis of structures with prestress effects: application to flexible solar generators, 8:20029 (R;FR;In French)

Charles River Associates, Inc., Boston, MA (USA)
- Study to establish cost predictions for the production of Redox chemicals, 8:20888 (R;US)

Chemical Dynamics Corp., Columbus, OH (USA)
- INSCAT; inelastic scattering method, 8:22337 (R;US)

Chem Systems, Inc., Fairfield, NJ (USA). Research and Development Group
- Development of alcohol-based synthetic transportation fuels from coal-derived synthesis gases. Final technical report, September 1979-July 1982, 8:19541 (R;US)

Chem Systems, Inc., New York (USA)
- Parametric analysis support for alcohol-fuels process development. Final report, 1 January-30 June 1981, 8:20022 (R;US)

Chem Systems, Inc., Tarrytown, NY (USA)
- ECUT: energy conversion and utilization technology program. Biocatalysis research activity. Technical and economic assessment of processes for the production of butanol and acetone, 8:19992 (R;US)
- Liquid-phase-methanol process-development unit: installation, operation, and support studies. Technical progress report No. 5, 1 October 1982-31 December 1982, 8:19947 (R;US)

Chicago Univ., IL (USA)
- Coal-transformation chemistry. Eleventh quarterly progress report, 8:19514 (R;US)
- Depth to and concentrations of water in large bodies of silicic magma. Progress report, July 1, 1982-June 30, 1983, 8:20147 (R;US)

Cincinnati Univ., OH (USA). H.N. Fisk Lab. of Sedimentology
- Final report of special geological, geochemical, and petrological studies of the Devonian shales in the Appalachian Basin, 8:19750 (R;US)

City Coll., New York (USA). Dept. of Physics
- Study of the formation of surface films: critical conditions for growth. Progress report, June 1, 1982-May 31, 1983, 8:21159 (R;US)

Clark Univ., Worcester, MA (USA)
- Atomic-mass measurements and nuclear spectroscopy at TRISTAN. Progress report, February 1, 1982-January 31, 1983, 8:22369 (R;US)

Coal Research Association of New Zealand, Wellington
- Beneficiation of Stockton coal by dense-media processes using organic parting liquids. Preliminary tests of prototype, 8:19621 (R;NZ)

Cold Regions Research and Engineering Lab., Hanover, NH (USA)
- Conduction phase change beneath insulated heated or cooled structures, 8:20892 (R;US)

Colorado Geological Survey, Denver (USA)
- Appendices of an appraisal for the use of geothermal energy in state-owned buildings in Colorado. Section A. Alamosa, 8:20187 (R;US)
- Appendices of an appraisal for the use of geothermal energy in state-owned buildings in Colorado. Section D. Durango, 8:20189 (R;US)
- Appendices of an appraisal for the use of geothermal energy in state-owned buildings in Colorado. Section E. Glenwood Springs, 8:20188 (R;US)
- Appendices of an appraisal for the use of geothermal energy in state-owned buildings in Colorado. Section C. Burlington, 8:20190 (R;US)
- Colorado's hydrothermal resource base: an assessment, 8:20145 (R;US)

Colorado School of Mines, Golden (USA)
- Liquid-vapor equilibria for ternary natural gas systems. Annual report Sep 80-Sep 81, 8:19772 (R;US)

Colorado School of Mines, Golden (USA). Dept. of Chemical and Petroleum Refining Engineering
- Enthalpy measurement of coal-derived liquids. Technical progress report, November 1982-January 1983, 8:19559 (R;US)

Colorado State Univ., Fort Collins (USA)
- Fort St. Vrain Nuclear Generating Station Environmental Radiation Surveillance Program. Summary report, third and fourth quarters, July-December 1982, 8:20623 (R;US)

Colorado State Univ., Fort Collins (USA). Dept. of Agricultural and Chemical Engineering
- Procedures for predictive analysis of selected hydrologic impacts of surface mining. Final report Sep 76-Sep 81, 8:19603 (R;US)

Colorado State Univ., Fort Collins (USA). Dept. of Chemistry
- Cross-polarization nuclear magnetic resonance studies of coals, coal-conversion products, and coal-conversion catalysts. Final technical report, 8:19554 (R;US)

Colorado Univ., Boulder (USA)
- Light-scattering studies of lower-dimensional colloidal-particle and critical-fluid systems. Progress report, August 1, 1982-July 31, 1983, 8:21162 (R;US)
- X-ray spectroscopic observations and modeling of supernova remnants, 8:22111 (R;US)

Colorado Univ., Boulder (USA). Nuclear Physics Lab.
- Technical progress report, 8:22344 (R;US)

Colorado Univ., Denver (USA). Health Sciences Center
- Plutonium burdens in people living around the Rocky Flats plant. Final report 1976-79, 8:21968 (R;US)

Columbia Univ., New York (USA)
- An imaging gas scintillation proportional counter for the detection of subkiloelectron-volt x-rays, 8:21581 (R;US)
- Experimental observations of MHD instabilities in the high-beta tokamak Torus-II, 8:22602 (R;US)
- Spectroscopy from 2 to 200 kev, 8:22124 (R;US)

Columbia Univ., Palisades, NY (USA). Lamont-Doherty Geological Observatory

Earthquake hazard studies in New York State and adjacent areas. Final report, April 1976-June 1982, 8:22051 (R;US)

Columbus Zoological Gardens, Powell, OH (USA)

Feasibility study for a solar greenhouse at the Columbus Zoo (Engineering Materials), 8:20115 (E;US)

Combustion Engineering, Inc., Windsor, CT (USA)

Combustion characterization of coals for industrial applications. Third quarterly progress report, 1 October 1982-31 December 1982, 8:19635 (R;US)

Combustion Engineering, Inc., Windsor, CT (USA). Computer Services Section

CEXE;INCEXE; one-group, three-dimensional xyz xenon oscillation, 8:20520 (R;US)

Comision Nacional de Energia Atomica, Buenos Aires (Argentina). Dept. de Reactores

TRIFIDO; pulsed neutron source data analysis, 8:20633 (R;AR)

Comitato Nazionale per l'Energia Nucleare, Casaccia (Italy). Dipartimento Radiazioni e Ricerche di Sicurezza e Protezione

Seismic data summary for the colli albani area, 8:22037 (R;IT;IT)

Comitato Nazionale per l'Energia Nucleare, Casaccia (Italy). Dipartimento Radiazioni e Richerche di Sicurezza e Protezione

Proposed classification of biotapological marine ecosystems off the coast of Italy. Part I, 8:21877 (R;IT;IT)

Comitato Nazionale per l'Energia Nucleare, Casaccia (Italy). Dipartimento Reattori Veloci

ALEATO: code for processing numerical data by IBM-370, 8:22825 (R;IT;IT)

Comitato Nazionale per l'Energia Nucleare, Casaccia (Italy). Dipartimento Ricerca Tecnologica di Base e Avanzata

ALEATO: code for processing numerical data by IBM-370, 8:22825 (R;IT;IT)

Comitato Nazionale per l'Energia Nucleare, Fiascherino (Italy). Dipartimento Radiazioni e Ricerche di Sicurezza e Protezione

Proposed classification of biotapological marine ecosystems off the coast of Italy. Part I, 8:21877 (R;IT;IT)

Comitato Nazionale per l'Energia Nucleare, Frascati (Italy). Lab. Nazionali di Frascati

Detailed numerical code to analyze pumping linear cavities for solid-state lasers, 8:21399 (R;US)

Comitato Nazionale per l'Energia Nucleare, Rome (Italy)

Analysis of characteristic curves of the PC.1 and PC.2 centrifugal pumps of the CPC-1 system, 8:20417 (R;DE;IT)

Management and control of the IBM 370-168 system with the AG02 system, 8:22871 (R;IT;IT)

Comitato Nazionale per l'Energia Nucleare, Rome (Italy). Direzione Centrale della Sicurezza Nucleare e della Protezione Sanitaria

Proposed classification of biotapological marine ecosystems off the coast of Italy. Part I, 8:21877 (R;IT;IT)

Comitato Nazionale per l'Energia Nucleare, Trisaia (Italy). Dipartimento Ciclo del Combustibile

Annual meteorological data at CRN Trisaia, 1978, 8:21677 (R;IT;IT)

Annual meteorological data at Trisaia, 1976, 8:21675 (R;IT;IT)

Annual meteorological data for CRN Della Trisaia, 1977, 8:21676 (R;IT;IT)

Annual meteorological data for CRN Della Trisaia, 1979, 8:21678 (R;IT;IT)

Commission of the European Communities, Brussels (Belgium)

Geothermal heating, 8:20186 (R;XE)

Commission of the European Communities, Ispra (Italy)

^{237}U nelle ricadute atmosferiche): Ispra 1980 (^{237}U in atmospheric fall-out): Ispra 1980), 8:21804 (R;US)

Commission of the European Communities, Karlsruhe (Germany, F.R.). European Inst. for Transuranium Elements

Correlation between fuel structure and mechanical properties of UO$_2$, 8:20611 (R;US)

Mechanical stability of a Cm-doped celsian glass-ceramic, 8:21156 (R;XE)

Commission of the European Communities, Luxembourg

A european atomic energy Community Report. Part I: comparative risks from electricity generating systems. Part II: risk assessment of energy systems. Final report, 8:20274 (R;US)

A theoretical study on the growth of large sodium vapour bubbles in liquid sodium, 8:20692 (R;US)

Advanced electrochemical energy storage devices, 8:20750 (R;XE)

Analysis of the factors which determine the COP of a heat pump and a feasibility study on ways and means of increasing same, 8:20902 (R;XE)

Conversion and chemical storage of solar energy in a photoelectrochemical cell, 8:20000 (R;XE)

Corrosion behaviour of engineering materials at elevated temperatures in an oxidising environment containing sulphur derivatives: influence of the composition of aggressive media and of the alloys under test (tenue a la corrosion a temperature elevee de materiaux par les milieux oxydants contenant des derives soufres: influence de la composition des phases agressives et des allinges exprimentes). Final report, 8:21082 (R;US)

Design, construction and testing of a gas engine driven high temperature industrial heat pump, 8:20973 (R;XE)

Development of a method of preparing ZrO$_2$ (Y$_2$O$_3$) thin film electrolytes on porous supporting materials, 8:19909 (R;XE;In German)

Development of a thermal storage system based on the heat of absorption in hygroscopic materials, 8:20142 (R;XE)

Dutch solar pilot test facility, 8:20092 (R;XE)

Effect of the electrical field in the membrane of photosynthesis, 8:19999 (R;XE)

EFOM 12C software: general overview. Final report, 8:22876 (R;US)

Energy models of European communities implementation and methodological tests in Italy. Final report, 8:20796 (R;US)

Energy revovery from waste, with special regard to the possibility of producing high-grade granulated insulating materials by swelling processes, 8:20972 (R;DD;In German)

Etude des possibilites de recuperation des chaleurs perdues dans les installations thermiques: application aux cokeries classiques (study of ways of recovering waste heat from heat consuming installations: applications to traditional coke ovens). Final report, 8:20978 (R;US)

Experimental Rankine cycle engine designed for heat recovery from exhaust gases of industrial plants, 8:21471 (R;XE)

Final report of the E.C. comparison of the national standard pyrheliometers, 8:19968 (R;XE;In French)

Gas bubble behaviour and ohmic potential drop during water electrolysis, 8:19911 (R;XE)

Kinetic factors controlling the yield of photosystem II and O$_2$ emission, 8:21267 (R;XE)

Long-term alternative energy R and D strategies. Final report, 8:20768 (R;US)

Novel oxides having high protonic conductivity as electrolyte for low temperature water vapour electrolysis, 8:19910 (R;XE)

Nuclear data guide for reactor neutron metrology. part I: activation reactions (1979 edition). Part II: fission reactions (1979 edition), 8:20558 (R;US)

Photochemical dissociation of water adsorbed in artificial membranes made from phyllosilicates, 8:21270 (R;XE)

Photochemical dissociation of water by means of visible light, 8:21269 (R;XE)

Pilot Test Facility (P.T.F.), 8:20094 (R;XE;In French)

Present state of technology of recovery and conversion process for synthetic fuels, 8:20864 (R;XE)

Present state of technology of recovery and conversion process for synthetic fuels, 8:19518 (R;XE)

Presentation of the software for central control system 1 of the solar pilot test facilities. Vol. 3, 8:20093 (R;XE)

Properties and electron transfer reactivity of coordination compounds for the photochemical splitting of water, 8:19912 (R;XE)

Radiation protection: progress report. 1981, 8:21967 (R;US)

Recovery of heat from exhaust air of spray driers in the dairy industry. Summary report (final), 8:20976 (R;US)

Regional analysis of potential energy production from agricultural wastes: a technical and economic study. Final report, 8:19957 (R;US)

Round table meeting on chemical and physical valorisation of coal, 8:19519 (R;XE)

Signal transmission via the electrical house wiring system for a control system for energy conservation in households and small business, 8:20903 (R;XE;In German)

State of the art of winning and conversion processes for synthetic fuels, 8:19530 (R;XE;In German)

Studies on parameterization of global, diffuse and direct solar radiation, 8:19967 (R;XE)

Study and evaluation of the latent cooling potential of chemical de-humidifiers, 8:20096 (R;XE)

Study of primary reactions of photosynthesis in green plants by rapid flash absorption spectroscopy, 8:21268 (R;XE)

- Study on the propagation of hydraulic fractures in rocks (etude sur la propagation des fractures hydrauliques dans les roches). Final report, 8:19766 (R;US)
- Summary report of the CEC-solar radiation data-programme 1975-1979, 8:19969 (R;XE)
- The evaluation of the Communities' geothermal energy, production and utilization of hydrogen, and systems analysis: development of models R and D sub-programmes. Research evaluation report no. 2, 8:20143 (R;US)
- Thermodynamic and engineering assessment of hybrid processes for the production of hydrogen with specific application to the Mark 13 process, 8:19908 (R;XE)
- Trends in energy demand in Italy (energy demand model for Italy). Final report, 8:20797 (R;US)
- United Kingdom solar pilot test facility, 8:20095 (R;XE)
- Use of immobilized hydrogenase for hydrogen production- final report, 8:19918 (R;US)

Commission of the European Communities, Strasbourg (France)

- Substitution of coal for petroleum in 'other industries', 8:20809 (R;XE;In German)

Computer Sciences Corp., Albuquerque, NM (USA)

- 200 kj copper foil fuses. Final report, 8:21304 (R;US)

Connecticut Univ., Storrs (USA)

- Alcohol recovery and carbon dioxide purification in alcohol plants using semipermeable membranes. Final technical report, September 1, 1981-August 31, 1982, 8:19989 (R;US)

Conoco, Inc., Library, PA (USA). Coal Research Div.

- Recycle-slurry-oil characterization. Quarterly report, April 1, 1982-June 30, 1982, 8:19513 (R;US)

Conoco Norway, Inc., Oslo

- Offshore petroleum industry environmental data requirements: emphasis on remote sensing, 8:19724 (R;NO)

Cornell Univ., Ithaca, NY (USA)

- Critical fields of liquid superconducting metallic hydrogen, 8:22557 (R;US)
- Energetic and environmental aspects of utilizing crop and forest residues for biomass energy. Final report, 8:19987 (R;US)

Cornell Univ., Ithaca, NY (USA). Center for Radiophysics and Space Research

- Studies related to the deep earth gas. Annual report Jan-Dec 81, 8:19677 (R;US)

Cornell Univ., Ithaca, NY (USA). Dept. of Agricultural Engineering

- Feasibility of biogas production on farms, 8:20021 (R;US)

Cornell Univ., Ithaca, NY (USA). Dept. of Food Science

- Whey protein concentrate market enhancement. Final report, 8:20016 (R;US)

Cornell Univ., Ithaca, NY (USA). Dept. of Materials Science

- Melt depth and regrowth kinetics in pulsed laser annealing of silicon and gallium arsenide, 8:21167 (R;US)

Cornell Univ., Ithaca, NY (USA). Dept. of Materials Science and Engineering

- Structure of (110) tilt boundaries in large-area solar silicon. Annual report, August 31, 1981-September 1982, 8:19994 (R;US)

Cornell Univ., Ithaca, NY (USA). Lab. of Nuclear Studies

- Breakdown of QCD factorization theorems for inclusive reactions, 8:22320 (R;US)

Corning Glass Works, NY (USA)

- Relationships between the sol-to-gel and gel-to-glass conversions, 8:21168 (R;US)

Corporate-Tech Planning, Inc., Waltham, MA (USA)

- Review and evaluation of automotive fuel conservation technologies. Volume I: summary. Final report Mar 79-Sep 81, 8:21018 (R;US)
- Review and evaluation of automotive fuel conservation technologies. Volume II: appendix C. Final report Mar 79-Sep 81, 8:21019 (R;US)

Corps of Engineers, Seattle, WA (USA). Seattle District

- Wynoochee Hydropower/Fish Hatchery: feasibility report and environmental impact statement. Final report, 8:19959 (R;US)

Council for Mineral Technology, Randburg (South Africa)

- Development of an on-line gold analyser, 8:21217 (R;ZA)

Crosby Gardens, Toledo, OH (USA)

- Recycling for solar applications. Final report, 8:20127 (R;US)

Crystal Systems, Inc., Salem, MA (USA)

- Silicon-ingot casting: heat-exchanger method (HEM); multi-wire slicing: fixed-abrasive slicing technique (FAST). Phase III and Phase IV. Silicon sheet-growth development for the large-area sheet task of the Low-Cost Solar-Array Project. Final report, December 15, 1978-June 30, 1981, 8:19993 (R;US)

Curtiss-Wright Corp., Wood-Ridge, NJ (USA). Power Systems Div.

- High-Temperature Turbine-Technology Program. Phase II. Technology test and support studies. Design and development of a regeneratively fuel cooled high temperature gas turbine combustor for operation on low Btu gas, 8:20246 (R;US)

D

Dale (Jack) Associates, Inc., Towson, MD (USA)

- Energy conservation manual for multi-family dwellings, 8:20899 (R;US)

Danmarks Tekniske Hoejskole, Lyngby. Lab. for Varmeisolering

- Simulation-program validation using domestic hot-water-system data, 8:20100 (R;DK)

D'Appolonia Consulting Engineers, Albuquerque, NM (USA)

- Basic data report for drillhole AEC 8 (Waste Isolation Pilot Plant - WIPP), 8:19866 (R;US)

Delaware Univ., Lewes (USA). Coll. of Marine Studies

- Biological responses of the american oyster 'Crassostrea virginica' (gmelin) to thermal effluent in the Chesapeake-Delaware Bay area. Final report, 8:21986 (R;US)

Delaware Univ., Newark (USA)

- Substituting power plant waste heat for on-farm heat requirements. Final report, 8:20977 (R;US)

Denver Research Inst., CO (USA)

- Feasibility of financial incentives to reuse low quality waters in the Colorado River Basin, 8:20280 (R;US)

Department of Energy, Grand Forks, ND (USA). Grand Forks Energy Technology Center

- Homogeneous catalysis of lignite liquefaction with hydrogen sulfide, 8:19431 (R;US)

Department of Energy, Morgantown, WV (USA). Morgantown Energy Technology Center

- Advanced gasification projects, 8:19435 (R;US)
- Particulate sampling and characterization. Extractive sampling in situ characterization available instrumentation, 8:21699 (R;US)

Department of Energy, New York (USA). Environmental Measurements Lab.

- Environmental Measurements Laboratory. Environmental report, March 1-September 1, 1982, 8:21832 (R;US)

Department of Energy, Oak Ridge, TN (USA). Technical Information Center

- Energygrams: brief descriptions of energy technology, 8:20754 (R;US)
- Fusion Energy Update: a current awareness journal, 8:22595 (R;US)
- Waste isolation: a bibliography, 8:19828 (R;US)

Department of Energy, Pittsburgh, PA (USA). Pittsburgh Energy Research Center

- Description of the method of producing coatings of Raney nickel catalyst by flame-spraying and findings obtained by examining samples of the coatings, 8:21069 (R;US)
- Industrial firing of coal-oil mixtures, 8:19632 (R;US)

Department of Energy, Pittsburgh, PA (USA). Pittsburgh Energy Technology Center

- Combustion of coal-oil mixtures in a 700-HP watertube boiler, 8:19634 (R;US)
- Gas-solid transport flow regimes: design and measurement, 8:19617 (R;US)
- Oxydesulfurization of coal and sulfur-containing compounds, 8:19619 (R;US)
- Settling characteristics of coal-oil mixtures and some model systems, 8:19633 (R;US)

Department of Energy, Pittsburgh, PA (USA). Pittsburgh Mining Technology Center

- Recent developments in coal preparation in the USA, 8:19618 (R;US)

Department of Energy, Washington, DC (USA)

- Beta measurement evaluation and upgrade, 8:19894 (R;US)
- National fuel-cell program, 8:20886 (R;US)

Department of Energy, Washington, DC (USA). Energy Information Administration
Cost and quality of fuels for electric-utility plants: 1981 annual, 8:20817 (R;US)
Energy company development patterns in the postembargo era. An overview of financial performance, 1974-1980. Volume 2, statistical tables, 8:20772 (R;US)
Energy information. Quarterly report: third quarter, 1982, 8:20789 (R;US)
Energy information report to Congress: quarterly report. Second quarter, 1982, 8:19691 (R;US)
Energy information report to Congress: quarterly report. Fourth quarter, 1981, 8:19647 (R;US)
Energy information report to Congress: quarterly report. First quarter, 1982, 8:19648 (R;US)
Monthly Energy Review, 8:20855 (R;US)
Monthly energy review, 8:20857 (R;US)
Monthly Energy Review, 8:20856 (R;US)
Monthly energy review, 8:19698 (R;US)
Monthly energy review, 8:19699 (R;US)
Monthly energy review, 8:19649 (R;US)
Monthly energy review. First half 1982 summary, 8:20858 (R;US)

Department of the Interior, Washington, DC (USA)
Separation of zirconium and uranium, 8:19796 (P;US)

Department of Transportation, Cambridge, MA (USA). Transportation Systems Center
Fuel economy and exhaust emissions characteristics of a diesel vehicle: results of the prototype Volkswagen 1.5-liter turbocharged rabbit tests. Final report, 8:21015 (R;US)

Deutsche Automobilgesellschaft m.b.H., Esslingen (Germany, F.R.)
Development of gas phase metallized plaques for electrodes of storage batteries, in particular for nickel oxide electrodes. Final Report, Jul. 1979, 8:20742 (R;DE;In several languages)

Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt e.V., Aachen (Germany, F.R.). Inst. fuer Theoretische Gasdynamik
Advanced biostack experiment, 8:21965 (R;US)

Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt e.V., Koeln (Germany, F.R.)
Effects of a large temperature gradient on the structure of directionally solidified eutectic composites and superalloys, 8:21078 (R;DE;In German)
Fracture mechanics in fiber reinforced composite materials, taking as examples B/Al and CFRP, 8:21137 (R;DE;In German)

Deutsche Gesellschaft fuer Chronometrie e.V., Stuttgart (Germany, F.R.)
Electrochemical systems as energy source for electronic wrist watches, 8:20751 (R;DE;In German)

Deutsche Presse-Agentur G.m.b.H., Hamburg (Germany, F.R.)
Energy reserves and energy conservation. Pt. 1, 8:20810 (R;DE;In German)
Energy supplies and energy conservation. Pt. 2, 8:20862 (R;DE;In German)

Deutsches Atomforum e.V., Bonn (Germany, F.R.)
Light ion ignitors for inertial confinement fusion: Progress toward proof-of-principle, 8:22769 (BA;DE)
Material problems in plasma fusion, 8:22771 (BA;DE;In German)

District of Columbia Dept. of Environmental Services, Washington, DC (USA)
I-95 Sanitary-Landfill gas recovery and utilization feasibility study, 8:20999 (R;US)

Dornier-System G.m.b.H., Friedrichshafen (Germany, F.R.)
Development of a prototype of a 10 kw small solar power plant. Final report, Sep. 1979, 8:20051 (R;DE;In several languages)
Development of a simple water pump driven with solar energy. Final report, 8:20053 (R;DE;In several languages)
High efficient collector for small solar-powered facilities. final report, 8:20119 (R;DE;In several languages)

Dortmund Univ. (Germany, F.R.). Abt. Chemietechnik
Investigations of an airlift reactor with external circulation with respect to its application as a bioreactor, 8:21426 (R;DE;In German)
Layout of a latent heat storage system with finned tubes, 8:20737 (R;DE;In German)

Dow Chemical Co., Golden, CO (USA). Rocky Flats Div.
KENO2;KENO4; Monte Carlo multigroup criticality code, 8:21329 (R;US)

Duesseldorf Univ. (Germany, F.R.). Medizinische Fakultaet
Uptake and fate of Cd and Zn in edible fungi of the Agaricus bisporus species, 8:22002 (R;DE;In German)

Duke Power Co., Charlotte, NC (USA)
ANVENT; los of coolant analysis Duke Power McGuire units, 8:20665 (R;US)

Duke Univ., Durham, NC (USA). Dept. of Chemistry
Reaction calorimetry for coal chemistry and catalysis. Quarterly report, November 1, 1982-January 20, 1983, 8:19563 (R;US)

Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA)
Determination of isotopic and gravimetric content of uranium and plutonium by mass spectrometry in nitric acid extraction solutions, 8:20386 (TG;US)

Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.
CLOUD; gamma-ray dose rate from a cloud, 8:21795 (R;US)
Contribution to the study of the behavior of fission-product niobium during the reprocessing of spent nuclear fuel, 8:19806 (TG;US)
ENDF/B-THERMOS; 30-group ENDF/B scattering kernels, 8:22506 (R;US)
FLANGE2/71-1; ENDF/B thermal scattering data, 8:22469 (R;US)
HAMMER;LITHE;HELP; critical analysis system, 8:20502 (R;US)
HERESY3; two-dimensional heterogeneous reactor calculation, 8:20493 (R;US)
Pathways for dose to man from buried solid waste, 8:19829 (R;US)
RAHAB Lattice Physics Modules; JOSHUA system lattice physics modules, 8:20551 (R;US)
STEAM-67; 1967 ASME steam and water properties, 8:21227 (R;US)
TIDY-J; Fortran source code editing processor, 8:22856 (R;US)

Dupuy (T.N.) Associates, Inc., Dunn Loring, VA (USA)
Analytic research on strategic, tactical and doctrinal military concepts: the concept of stability. Final report 1 May-19 Dec 79, 8:21665 (R;US)

Duquesne Univ., Pittsburgh, PA (USA). Dept. of Chemistry
Hydrogen bonding in asphaltenes and coal liquids. Quarterly report, November 1, 1982-January 31, 1983, 8:19558 (R;US)

E

Eagle-Picher Co., Joplin, MO (USA)
Nickel-zinc batteries for RPV applications. Final technical report 15 Nov 79-15 Aug 81, 8:21022 (R;US)

Eastern New Mexico Univ., Portales (USA). Dept. of Biology
Pilot study on the isolation, metabolism and adaptation of microorganisms to Santa Rosa tar sand hydrocarbons. Phase II. Final report, June 17, 1982-July 17, 1982, 8:19782 (R;US)

Eastern Products Corp., Andover, MA (USA)
Co-fired oil and tire-derived fuel: waste-tire energy-reclamation project, 8:20969 (R;US)

Ebasco Services, Inc., Newport Beach, CA (USA)
Integration of open-cycle MHD with various chemical and metallurgical processes, 8:20874 (R;US)

Ebasco Services, Inc., New York (USA)
Central-cell blanket-module-maintenance approach for the MARS high-temperature blanket, 8:22746 (R;US)

Economic Research Service, Washington, DC (USA). Economic Development Div.
Northern Great Plains coal mining: regional impacts. Agriculture information bulletin, 8:19657 (R;US)

Economic Research Service, Washington, DC (USA). Natural Resource Economics Div.
Wood and energy in Vermont. Staff report, 8:20017 (R;US)

EG and G Idaho, Inc., Idaho Falls (USA)
ERREST; loss of coolant rod bundle critical heat flux data analysis, 8:20660 (R;US)
Experiment data report for Semiscale Mod-2A Natural-Circulation Test S-NC-7C, 8:20715 (R;US)
Microcomputer simulation of nonlinear two-phase pressurizer dynamics, 8:20355 (R;US)
NRTS OS/360 Remote Job Entry; OS/360 MVT remote job entry system, 8:22841 (R;US)
Ohmically heated toroidal experiment (OHTE) mobile ignition test reactor facility concept study, 8:22725 (R;US)

PHROG; multi-group constant and fast spectra calculations, 8:20543 (R;US)
Predictor display concepts for use in nuclear-plant control, 8:20620 (R;US)
PREP;KITT; system fault tree evaluation codes, 8:20664 (R;US)
Prickett and Lonnquist aquifer simulation program for the Apple II minicomputer, 8:20148 (R;US)
Process for locating shallow land-burial sites for low-level radioactive waste. National Low-Level Radioactive Waste Management program, 8:19826 (R;US)
PTAC11; 2-pass assembler for the PDP-11 on 360, 8:22840 (R;US)
RELAP4/MOD6; transient thermal-hydraulic study, 8:20320 (R;US)
RIO; power plant reliability characteristics, 8:20675 (R;US)
RSAC; radiological safety analysis program, 8:20652 (R;US)
Semiscale Mod-2A Intermediate Break Test series: test-results comparison, 8:20724 (R;US)
SPIRT; stress-strains from transient pressures, 8:20674 (R;US)
STRAP; static & dynamic structural analysis, 8:21438 (R;US)
Survey of chemical and radiological indexes evaluating toxicity. National Low-Level Radioactive Waste Management Program, 8:19891 (R;US)
THERPP; thermodynamic properties hydrocarbons, 8:21153 (R;US)
THETA1B; fuel rod thermal response loss of coolant accidents, 8:20323 (R;US)
Utility of low-order linear nuclear-power-plant models in plant diagnostics and control, 8:20617 (R;US)
WHAM6; liquid-filled piping system analysis, 8:20562 (R;US)

EG and G, Inc., Goleta, CA (USA)
Introduction to fifth international workshop on mercuric iodide nuclear radiation detectors, 8:21570 (R;US)
Measurement of radioactive contaminated wastes, 8:19833 (R;US)
Review of mercuric iodide development program in Santa Barbara, 8:21572 (R;US)

EG and G, Inc., Las Vegas, NV (USA). Energy Measurements Group
Aerial radiological survey of the Callaway Plant and surrounding area, Fulton, Missouri, 8:21796 (R;US)

Electricite de France, 93 - Saint-Denis. Groupe des Labs.
Results of EDF/Framatome underclad crack-detection methods. Final report, 8:20371 (R;US)

Electric Power Research Inst., Palo Alto, CA (USA)
Electric-utility solar-energy activities: 1982 survey update. Special report, 8:19965 (R;US)
EPRI Research and Development Projects, 8:20268 (R;US)
Proceedings: support-structure corrosion in steam generators, 8:20356 (R;US)
PWR FLECHT SEASET systems effects: natural circulation and reflux condensation. Task plant report: NRC/EPRI/Westinghouse Report No. 12, 8:20714 (R;US)

Elektowaerme-Inst. e.V., Essen (Germany, F.R.)
Possibilities of energy recovery and integrated energy supply of foundries, 8:20992 (TG;US)

Energetics, Inc., Columbia, MD (USA)
Survey and analysis of federally developed technology, 8:20988 (R;US)

Energieforum Schweiz, Bern (Switzerland)
Swiss natural gas and petroleum research activities, 8:19716 (R;DE;GE)

Energy and Environmental Analysis, Inc., Arlington, VA (USA)
Regulatory impact analysis of the national ambient air quality standards for carbon monoxide. Final report, 8:21466 (R;US)

Energy and Environmental Engineering, Inc., Cambridge, MA (USA)
Investigate the effectiveness of calcium-treated coals in the capture of sulfur gases generated in staged fired combustors. First quarterly technical progress report, October 1, 1982-January 1, 1983, 8:19637 (R;US)

Energy and Environmental Policy Center, Cambridge, MA (USA)
Long-term consumer impacts of electricity-rate regulatory policies, 8:20826 (R;US)

Energy and Environmental Research Corp., Santa Ana, CA (USA)
Effects of fuel properties and atomization parameters on Nox control for heavy liquid fuel fired package boilers. Final report Jan 77-Jan 79, 8:21459 (R;US)
Mechanisms of NO/sub x/ formation and control: alternative and petroleum-derived liquid fuels, 8:19748 (R;US)

Energy, Inc., Idaho Falls, ID (USA)
RETRAN-02: a program for transient thermal-hydraulic analysis of complex fluid-flow systems. Volume 4. Applications, 8:20689 (R;US)

Energy Management Associates, Inc., Santa Clara, CA (USA)
Evaluation of superconducting magnetic energy storage systems. Final report, 8:20267 (R;US)

Energy Research and Development Administration, Pittsburgh, PA (USA). Pittsburgh Energy Research Center
On-line material balance for the 10-tpd SYNTHOIL PDU: software procedures, 8:19473 (R;US)

Envirodyne Engineers, Inc., St. Louis, MO (USA)
Air quality non-attainment areas in Region V, 8:21824 (R;US)

Environmental Protection Agency, Cincinnati, OH (USA). Industrial Environmental Research Lab.
Urban air-quality impacts of district-heating development, 8:20996 (R;US)

Environmental Protection Agency, Corvallis, OR (USA). Environmental Research Lab.
Effects of sulfuric acid rain on two model hardwood forests: throughfall, litter leachate, and soil solution, 8:22003 (R;US)
Simulation of nutrient loss from soils due to rainfall acidity, 8:21773 (R;US)

Environmental Protection Agency, Denver, CO (USA)
Solid state hydrogen pumping and storage material, 8:19930 (P;US)

Environmental Protection Agency, Research Triangle Park, NC (USA)
Annual report 1974, U.S. Environmental Protection Agency, Office of Research and Development, Research Triangle Park, North Carolina, 8:21761 (R;US)

Environmental Protection Agency, Research Triangle Park, NC (USA). Environmental Sciences Research Lab.
Atmospheric releases from standardized nuclear power plants: A wind tunnel study. Fluid modeling report No. 12, 8:20629 (R;US)

Environmental Protection Agency, Research Triangle Park, NC (USA). Industrial Environmental Research Lab.
Prospects for increasing the direct use of coal in industrial boilers. Final task report Nov 79-Nov 80, 8:19641 (R;US)

Environmental Protection Agency, Research Triangle Park, NC (USA). Monitoring and Data Analysis Div.
1976 national emissions report: national emissions data system of the aerometric and emissions reporting system (AEROS). Annual report, 8:21770 (R;US)
Air quality data - 1980 annual statistics including summaries with reference to standards. Annual report, 8:21750 (R;US)
National air pollutant emission estimates, 1970-1981. Final report, 8:21771 (R;US)
National Emissions Report (1978): National Emissions Data Systems (NEDS) of the Aerometric and Emissions Reporting System (AEROS). Annual report, 8:21749 (R;US)
National emissions report (1979): National Emissions Data Systems (NEDS) of the Aerometric and Emissions Reporting System (AEROS). Annual report, 8:21751 (R;US)

Environmental Protection Agency, Research Triangle Park, NC (USA). Office of Air Quality Planning and Standards
AEROS (Aerometric and Emissions Reporting System) information, 8:21765 (R;US)
AEROS manual series. Volume III: summary and retrieval manual. update number 2, 8:20780 (R;US)
Environmental impact assessment of control measures required for attainment of the national ambient air quality standard for ozone, 8:21820 (R;US)
Example Scope of Work for contracts to prepare SIP revisions to attain and maintain NAAQS. Guideline series, 8:21821 (R;US)
Guidance for the future use of NASN (This guideline replaces OAQPS number 1.2-020), 8:21769 (R;US)
Guidelines for air quality maintenance planning and analysis. Volume 5: Case studies in plan development, 8:21822 (R;US)
Preliminary assessment of adverse health effects from carbon monoxide and implications for possible modifications of the standard, 8:21819 (R;US)
Sensitivity analysis on Coburn model predictions of COHB levels associated with alternative CO standards (EPA staff paper), 8:22005 (R;US)
Surface coating of metal furniture - background information for promulgated standards, 8:21817 (R;US)

Environmental Protection Agency, Washington, DC (USA)
Notification of hazardous waste sites required under Section 103(c) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980: EPA region 2, 8:21844 (R;US)

- Notification of hazardous waste sites required under Section 103(c) of the CompRehensive Environmental response, Compensation and Liability Act (CERCLA) of 1980: EPA region 3, 8:21845 (R;US)
- Notification of hazardous waste sites required under Section 103(c) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980: EPA region 5, 8:21846 (R;US)
- Notification of hazardous waste sites required under Section 103(c) of the CompRehensive Environmental response, Compensation and Liability Act (CERCLA) of 1980: EPA region 7, 8:21847 (R;US)

Environmental Protection Agency, Washington, DC (USA). Office of International Activities
- US - Canada transboundary air pollution: Work Group 3A interium report on strategies and implementation, 8:21746 (R;US)

Environmental Protection Agency, Washington, DC (USA). Office of Research and Development
- Controlling sulfur oxides, 8:21747 (R;US)
- Research outlook 1982, 8:20779 (R;US)

Environmental Research and Technology, Inc., Concord, MA (USA)
- Continuous rural ozone data collection in the northeast United States, 8:21772 (R;US)

Environmental Resources Management, Inc., West Chester, PA (USA)
- Lower Susquehanna River hydrographic and water quality study, Summer 1981: Volume I. Final report, 8:21879 (R;US)
- Lower Susquehanna River hydrographic and water quality study, Summer 1981. Volume 2: appendices. Final report, 8:21880 (R;US)

ERA Technology Ltd., Leatherhead (UK)
- Building services automation. Final report, 8:20901 (R;US)

Erlangen-Nuernberg Univ., Erlangen (Germany, F.R.)
- Observability of atomic line features in strong magnetic fields, 8:22121 (R;US)

ESD Corp., Santa Clara, CA (USA)
- Development of lightweight hydraulic supports. Open file report Sep 78-May 82, 8:19611 (R;US)

European Organization for Nuclear Research, Geneva (Switzerland)
- Expectations for old and new physics at high energy colliders, 8:22268 (R;US)

European Space Agency, 75 - Paris (France)
- Application of remote sensing data on the continental shelf: proceedings of an EAREL-ESA symposium, 8:21858 (R;FR)
- Helium 2 cooling systems with long service live for space use: phase separation hybrid cooling systems, 8:21336 (R;FR)
- Report on the activities of space science department in 1980-1981, 8:22075 (R;FR)
- Solar system and its exploration, 8:22074 (R;FR)

European Space Research and Technology Centre, Noordwijk (Netherlands)
- Measurement of plasma drifts in planetary magnetospheres, 8:22172 (R;NL)
- The international solar polar mission (ISPM), 8:22129 (R;NL)

European Space Technology Center, Delft (Netherlands)
- Spectroscopy in x-ray astronomy, 8:22081 (R;US)

Evanston, City of, IL (USA)
- Demonstration of an a-c utility-connected wind generator in an urban setting. Final report, June 1979-December 1982, 8:20213 (R;US)

Experimental and Mathematical Physics Consultants, Santa Monica, CA (USA)
- Electron dose attenuation kernels for slab and spherical geometries. Final report, 8:20446 (R;US)

Exxon Corp., Florham Park, NJ (USA). Energy Venture Development Group
- Advanced solar/gas desiccant cooling system. Final report, 8:20101 (R;US)

Exxon Nuclear Idaho Co., Inc., Idaho Falls (USA)
- ICPP effluent monitoring report, December 1982, 8:21871 (R;US)
- ICPP effluent monitoring report, November 1982, 8:21799 (R;US)

Exxon Research and Engineering Co., Linden, NJ (USA). Advanced Energy Systems Labs.
- Simple model of Exxon's Zn/Br_2 battery, 8:20752 (R;US)

F

Factory Mutual Research Corp., Norwood, MA (USA)
- Quantification of fire properties of fuels and interaction with fire environment. Technical report, 8:21300 (R;US)
- Thermal endurance of construction materials at LNG facilities. Final report Oct 80-Sep 81, 8:19749 (R;US)

Federal Aviation Administration, Washington, DC (USA). Systems Research and Development Service
- Improved weather services for helicopter operations in the Gulf of Mexico. Final report, 8:19680 (R;US)

Federal Emergency Management Agency, Washington, DC (USA)
- Principles of warning and criteria governing eligibility of National Warning Systems (NAWAS) terminals, 8:22897 (R;US)

Fermi National Accelerator Lab., Batavia, IL (USA)
- Charm and beauty photoproduction at Fermilab, 8:22253 (R;US)
- Comparison of dimuon production by 125 GeV/c anti p and πp with predictions of the Drell-Yan model, 8:22254 (R;US)
- Design of the magnetized muon shield for the prompt-neutrino facility, 8:21573 (R;US)
- Future accelerators and their contributions, 8:22246 (R;US)
- Hadron jets in perspective, 8:22284 (R;US)
- Polarized e^{+-} - polarized p colliding beams: physics issues, 8:21491 (R;US)
- Remarks on future accelerators and future physics, 8:21474 (R;US)

Fichtner Beratende Ingenieure G.m.b.H. and Co. KG, Stuttgart (Germany, F.R.)
- Effect of pulsation pipelines in nuclear installations on the environment, 8:20698 (R;DE;GE)

Fish and Wildlife Service, Fort Collins, CO (USA). Western Energy and Land Use Team
- Results of an adaptive environmental assessment modeling workshop concerning potential impacts of drilling muds and cuttings on the marine environment. Workshop summary, 8:19734 (R;US)

Florida Inst. of Tech., Melbourne (USA)
- Space nuclear power and man's extraterrestrial civilization, 8:20448 (R;US)

Florida State Univ., Tallahassee (USA)
- Selective excitation, relaxation, and energy channeling in molecular systems. Progress report, December 1, 1981-November 30, 1982, 8:22193 (R;US)

Florida Univ., Gainesville (USA)
- Prediction of molecular infrared band and line intensities, 8:22200 (R;US)

Florida Univ., Gainesville (USA). Center for Wetlands
- Manual for using energy analysis for plant siting, 8:20289 (R;US)

Florida Univ., Gainesville (USA). Dept. of Nuclear Engineering Sciences
- GAKIN2; 10 multigroup time-dependent diffusion, 8:22453 (R;US)

Florida Univ., Gainesville (USA). Dept. of Physics
- QCD Monte-Carlo models for e^+e^- annihilations and hadron-hadron collisions, 8:22283 (R;US)

Flowpower, Inc., Huntington Station, NY (USA)
- Wind-energy resources in the area of the City of Buffalo, 8:20204 (R;US)

FluiDyne Engineering Corp., Minneapolis, MN (USA)
- MHD oxidant intermediate temperature ceramic heater study. Final report, 8:20882 (R;US)

FOM-Instituut voor Plasmafysica, Rijnhuizen (Netherlands)
- The belt-shaped screw-pinch reactor, 8:22742 (R;NL)

Forest Products Lab., Madison, WI (USA)
- A wood and bark fuel economics computer program (FEP). Forest service research paper, 8:19955 (R;US)

Forest Service, Asheville, NC (USA). Southeastern Forest Experiment Station
- Effect of seeding and site-preparation practices on the establishment of sericea (Lespedeza cuneata). Annual report, September 1, 1981-December 31, 1982, 8:21930 (R;US)

Forest Service, Berkeley, CA (USA). Pacific Southwest Forest and Range Experiment Station
- Social, economic and environmental effects of rising timber prices. Final report, 8:21887 (R;US)

Forschungsstelle fuer Internationale Agrarentwicklung e.V., Heidelberg (Germany, F.R.)
Energy from biomass: Possibilities of a regional development and the substitution of crude oil imports in Brazil, 8:20013 (R;DE;In German)
Foundation for the Technical Development of Engineering, Sao Paulo (Brazil)
Telemetry system for acquisition and recording of data: STAR, 8:22892 (R;BR;Portugese)
Framatome, 92 - Paris La Defense (France)
Results of EDF/Framatome underclad crack-detection methods. Final report, 8:20371 (R;US)
Franklin Pierce Law Center, Concord, NH (USA). Energy Law Inst.
Developer handbook for Section 210 of PURPA for Georgia, 8:20829 (R;US)
Developer handbook for Section 210 of PURPA for Maine, 8:20833 (R;US)
Developer handbook for Section 210 of PURPA for Montana, 8:20827 (R;US)
Developer handbook for Section 210 of PURPA for New Hampshire, 8:20830 (R;US)
Public Utility Commission manual for Section 210 of PURPA for North Carolina, 8:20831 (R;US)
Public Utility Commission manual for Section 210 of PURPA for Montana, 8:20834 (R;US)
Public Utility Commission manual for Section 210 of PURPA for Colorado, 8:20832 (R;US)
Public Utility Commission manual for Section 210 PURPA for New york, 8:20828 (R;US)
Fraunhofer-Gesellschaft zur Foerderung der Angewandten Forschung e.V., Freiburg im Breisgau (Germany, F.R.). Inst. fuer Werkstoffmechanik
Corrosion and high temperature resistant coatings for molybdenum, made out of iron and nickel alloys and applied by explosive welding, 8:21087 (R;DE;In German)
Freie Univ. Berlin (Germany, F.R.). Fachbereich Politische Wissenschaft
Discussion on energy policy in the SPD, 8:20801 (R;DE;In German)

G

Gallaer (C.A.), Pittsburgh, PA (USA)
Electrostatic-precipitator reference manual. Final report, 8:19588 (R;US)
Gandhi Peace Foundation, New Delhi (India)
Gobar gas plant - a study, 8:19936 (R;US)
Gas-Cooled Reactor Associates, La Jolla, CA (USA)
Application of the lines-of-protection concept to the HTGR-SC/C, 8:20688 (R;US)
Economic ground rules for the HTGR program for 1983, 8:20392 (R;US)
FY1983 HTGR summary level program plan, 8:20481 (R;US)
High Temperature Gas-Cooled Reactor Steam Cycle/Cogeneration Lead Project Decision Package: executive summary, 8:20487 (R;US)
High-temperature gas-cooled reactor steam cycle/cogeneration. Design and technology development plan for Nuclear Steam Supply System. Volume I: Summary, 8:20486 (R;US)
High-temperature gas-cooled reactor steam-cycle/cogeneration lead plant design and cost report. Volume I: summary, 8:20485 (R;US)
High-temperature gas-cooled reactor steam-cycle/cogeneration lead project: national incentives, 8:20488 (R;US)
Industrial process-heat market assessment: an update, 8:20489 (R;US)
GA Technologies, Inc., San Diego, CA (USA)
Data-acquisition systems for the present and the future, 8:22726 (R;US)
Theory of lower-hybrid-current drive at low densities, 8:22604 (R;US)
GCA Corp., Bedford, MA (USA). GCA Technology Div.
Combustion of oil shale in fluidized-bed combustors: an overview. Final report May-Nov 81, 8:19787 (R;US)
Finalization of reports entitled Updated Acid Rain Information Book and Simplification Approaches to Protecting PSD Class I Areas, 8:21698 (R;US)
Fluidized-bed combustion technology overview. Final report Dec 79-Dec 80, 8:20276 (R;US)
Technology overview: circulating fluidized-bed combustion. Final report, 8:21463 (R;US)
General Accounting Office, Washington, DC (USA)
Priority support for energy programs under the Defense Production Act, 8:20799 (R;US)
Questions regarding Clinch River Breeder Reactor project funding and costs, 8:20426 (R;US)
General Accounting Office, Washington, DC (USA). Energy and Minerals Div.
Analysis of two allegations about the Tennessee Valley Authority's energy-conservation programs and their efficiency and effectiveness, 8:20785 (R;US)
Federal Government is still not adequately prepared to respond to major electrical emergencies, 8:20841 (R;US)
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Interim report on GAO's review of the total cost estimate for the Clinch River Breeder Reactor project , 8:20428 (R;US)
General Accounting Office, Washington, DC (USA). Office of the Comptroller General
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Interior's report of shut-in or flaring wells unnecessary, but oversight should continue, 8:20807 (R;US)
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General Accounting Office, Washington, DC (USA). Resources, Community and Economic Development Div.
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Environmental and socio-economic status of the Hampshire energy project, 8:21888 (R;US)
Evaluation of administrative procedures at the Synthetic Fuels Corporation, 8:20813 (R;US)
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General Atomic Europe, Zurich (Switzerland)
GAUGE; two-dimensional, few-group, neutron diffusion in hexagonal geometries, 8:22459 (R;US)

General Dynamics/Convair, San Diego, CA (USA)
Study of multi-megawatt technology needs for photovoltaic space power systems. Volume 1: executive summary, 8:20041 (R;US)
Study of multi-megawatt technology needs for photovoltaic space power systems, volume 2. Final report, 8:20042 (R;US)

General Dynamics Corp., St. Louis, MO (USA)
Central-cell blanket-module-maintenance approach for the MARS high-temperature blanket, 8:22746 (R;US)

General Electric Co., Cincinnati, OH (USA). Aircraft Engine Group
MICHRD; microhardness measurement analysis, 8:21039 (R;US)

General Electric Co., Cincinnati, OH (USA). Nuclear Materials and Propulsion Operation
AVOID; annular void cross section calculation, 8:22445 (R;US)

General Electric Co., Pleasanton, CA (USA). Vallecitos Nucleonics Lab.
BURNUP; heavy element isotopic burnup analysis, 8:20509 (R;US)

General Electric Co., San Jose, CA (USA)
FLARE; three-dimensional reactivity and power distribution, 8:20494 (R;US)

General Electric Co., San Jose, CA (USA). Advanced Products Operation
RAPFU; fuel cycle parameters for fast breeders, 8:20407 (R;US)

General Electric Co., San Jose, CA (USA). Nuclear Energy Div.
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TROUT; mug multigroup cross section library maintenance, 8:20538 (R;US)

General Electric Co., San Jose, CA (USA). Nuclear Engineering Div.
Mark I containment program structural-acceptance criteria: Plan Unique Analysis Application Guide, 8:20330 (R;US)
Oxygen suppression in boiling water reactors. Phase 2. Annual report 1981, December 2, 1980-December 31, 1981, 8:20326 (R;US)

General Electric Co., St. Petersburg, FL (USA). Neutron Devices Dept.
Field shaping to improve vacuum-diode voltage holdoff, 8:21443 (R;US)
Interfacing a torsion pendulum with a microcomputer, 8:21431 (R;US)
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General Electric Co., Sunnyvale, CA (USA). Advanced Products Operation
FORE2; fast reactor excursion calculations, 8:20496 (R;US)
REAX; resolved resonance epithermal cros sectionns, 8:20598 (R;US)

General Electric Co., Sunnyvale, CA (USA). Advanced Reactor Systems Dept.
Doppler and sodium void worth effect on the progression of an HCDA LOF event in CRBRP heterogeneous core, 8:20416 (R;US)

General Electric Co., Sunnyvale, CA (USA). Breeder Reactor Development Operation
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FREADM1; fast reactor core accident analysis, 8:20655 (R;US)
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VELVET2; turbulent flow in LMFBR rod bundle, 8:20409 (R;US)

General Motors Corp., Indianapolis, IN (USA). Detroit Diesel Allison Div.
Support and power-plant documentation for the gas-turbine-powered-bus demonstration program. Final report, 1 January 1980-30 September 1981, 8:21013 (R;US)

Geneva Univ. (Switzerland)
Magnetic ordering and electronic structure of $CeAl_3$, 8:21059 (R;US)

Geo-Centers, Inc., Newton Upper Falls, MA (USA)
Evaluation of plasma jet ignition for improved performance of alternate fuels. Final report Feb-Aug 82, 8:19946 (R;US)

Geological Survey, Albuquerque, NM (USA). Water Resources Div.
Results of hydrologic tests and water-chemistry analyses, wells H-6A, H-6B, and H-6C, at the proposed Waste Isolation Pilot Plant site, southeastern New Mexico. Water resources investigations (final), 8:19862 (R;US)

Geological Survey, Arlington, VA (USA)
Summary chart of geological data from the COST No. B-3 well, US Mid-Atlantic Continental Slope, 8:19679 (R;US)

Geological Survey, Denver, CO (USA)
Application of hcmm data to regional geologic analysis for mineral and energy resource evaluation, 8:22039 (R;US)
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Geologic map and coal deposits of the Canaan peak Quadrangle, Garfield and Kane Counties, Utah, 8:19607 (R;US)
Land use and land cover, 1978 Hot Springs, South Dakota, Nebraska, 8:21850 (R;US)

Geological Survey, Reston, VA (USA)
Estimation of the future rates of oil and gas discoveries in the western Gulf of Mexico. Professional paper, 8:19678 (R;US)
Geologic map of the Crater Springs Known Geothermal Resources Area and vicinity, Juab and Millard Counties, Utah, 8:20153 (R;US)
Synthetic fuels development: earth-science considerations, 8:19602 (R;US)

- **Geological Survey, Washington, DC (USA)**
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- **Georgia Inst. of Tech., Atlanta (USA)**
  - Self-sustaining erosion-resistant low-Z coatings for first wall and limiter applications. I. Theory, 8:22693 (R;US)
- **Georgia Inst. of Tech., Atlanta (USA). Engineering Experiment Station**
  - An assessment of central-station congeneration systems for industrial complexes. Final report Mar 76-Mar 78, 8:20277 (R;US)
  - Energy conservation in the poultry processing industry. Phase I. Final report, June 1977-July 1978, 8:20966 (R;US)
  - Energy conservation in the poultry-processing industry. Final report-processing industry, 8:20967 (R;US)
- **Georgia Inst. of Tech., Atlanta (USA). Nuclear Engineering Dept.**
  - Outer-shell excitation mechanisms and static-mode laser-fluorescence spectroscopy of sputtered atoms, 8:22186 (R;US)
- **Georgia State Univ., Atlanta (USA). Dept. of Physics and Astronomy**
  - Cross sections for inelastic scattering of electrons by atoms: selected topics related to electron microscopy, 8:22183 (R;US)
- **Gesellschaft fuer Reaktorsicherheit m.b.H. (GRS), Koeln (Germany, F.R.)**
  - GARLIC-B. A digital code for real-time calculation of the transient behaviour of nodal and global core and plant parameters of BWR nuclear power plants, 8:20329 (R;DE)
  - Sensitivity study of the thermomechanical reaction of rock salt to radioactive waste storage, 8:19830 (R;DE;In German)
- **Gesellschaft fuer Schwerionenforschung m.b.H., Darmstadt (Germany, F.R.)**
  - Derivation of an elementary RFQ formula, 8:21492 (R;DE)
  - Nucleus fragmentation induced by a high - energy hadron some experimental results. Pt. 3, 8:22350 (R;DE)
  - Shape transitions at high spin, 8:22375 (R;US)
- **Gibbs and Cox, Inc., Arlington, VA (USA)**
  - 100- and 400-MW(e) large-scale floating OTEC platform conceptual designs. Final report, 8:20072 (R;US)
  - Conceptual designs of a 100- and 400-MW large-scale OTEC platform: an update, 8:20075 (R;US)
- **Giessen Univ. (Germany, F.R.). Fachbereich Veterinaermedizin und Tierzucht**
  - Study of endogenous and exogenous influence on lead (Pb) and cadmium (Cd) content in muscles and organs of deer (Capreolus capreolus L.) and wild rabbit (Lepus cuniculus L.), 8:21828 (R;DE;In German)
- **Gilbert Associates, Inc., Reading, PA (USA)**
  - Study of a conceptual nuclear energy center at Green River, Utah: institutional and licensing issues, 8:20464 (R;US)
  - Study of a conceptual nuclear energy center at Green River, Utah. Power demand, load center assessment and transmission, 8:20625 (R;US)
- **GKSS-Forschungszentrum Geesthacht G.m.b.H., Geesthacht-Tesperhude (Germany, F.R.)**
  - Vibration phenomena in large scale pressure suppression tests, 8:20693 (R;DE)
- **GKSS-Forschungszentrum Geesthacht G.m.b.H., Geesthacht-Tesperhude (Germany, F.R.). Inst. fuer Physik**
  - Theoretical neutron spectrum of a 14 MeV neutron tube with cylindrical ion acceleration structure, 8:21518 (R;DE)
- **GKSS-Forschungszentrum Geesthacht G.m.b.H., Hamburg (Germany, F.R.)**
  - Comparative examination of operating conditions of wind energy converters in the 10kW output class, 8:20215 (R;DE;GE)
- **Glasstone (Samuel), Oak Ridge, TN (USA)**
  - Energy Deskbook, 8:22822 (R;US)
- **Gould, Inc., Rolling Meadows, IL (USA). Gould Labs.-Energy Systems**
  - Studies leading to the development of high-rate lithium sulfuryl chloride battery technology. Quarterly report No. 1, 1 Sep-31 Dec 81, 8:20741 (R;US)
- **Graz Univ. (Austria)**
  - A particle spectrometer with a large geometric factor for the energy range 0.1 to 30 keV, 8:21577 (R;AT)
- **Gulf Radiation Technology, San Diego, CA (USA)**
  - CAGE;BIRD;SPEC; time-of-flight data analysis, 8:22501 (R;US)

H

- **Haas (Carl) G.m.b.H. und Co., Schramberg (Germnay, F.R.)**
  - Laser tool: pulsed solid state laser for welding and ablation of material. Final report, September 1979, 8:21383 (R;US;In several languages)
- **Hagler, Bailly and Co., Washington, DC (USA)**
  - Assessment of electric-utility ownership and operation of industrial-cogeneration facilities. Final report, 8:20815 (R;US)
  - Assessment of electric-utility ownership and operation of industrial cogeneration facilities. Final report, 8:20816 (R;US)
- **Hahn-Meitner-Institut fuer Kernforschung Berlin G.m.b.H. (Germany, F.R.)**
  - CAMAC instrumentation for monitoring and control of the VICKSI accelertaors - description of the CAMAC and auxiliary equipment, 8:21575 (R;DE;In German and English)
  - Mechanical stability of a Cm-doped celsian glass-ceramic, 8:21156 (R;XE)
- **Hamburg Univ. (Germany, F.R.). Fachbereich Geowissenschaften**
  - Contribution to the measurement of water wave induced infrasound waves in Hamburg and their relation with microseismic waves and with the atmospheric propagation conditions, 8:21683 (R;DE;In German)
- **Hanford Engineering Development Lab., Richland, WA (USA)**
  - DSTRESS; transient fuel model for clad strain, 8:20672 (R;US)
  - ETOX3; multigroup constants from ENDF/B for one dimension, 8:22480 (R;US)
  - Fabrication data package for HEDL-RI dosimetry in the Maine Yankee Replacement Surveillance Capsule 263 and cavity positions, 8:20372 (R;US)
  - FFTF radioactive solid waste handling and transport, 8:19831 (R;US)
  - FFTF reactor-characterization program: gamma-ray measurements and shield characterization, 8:20645 (R;US)
  - HERMES; regional radiological effects analysis, 8:20663 (R;US)
  - HFN; one-dimensional, multigroup diffusion in slabs, cylinders, and spheres, 8:22436 (R;US)
  - LWR Pressure-Vessel Surveillance Dosimetry Improvement Program. 1982 annual report, October 1, 1981- September 30, 1982, 8:20346 (R;US)
  - LWR Pressure-Vessel Surveillance Dosimetry-Improvement Program. Quarterly progress report, April 1982-June 1982, 8:20345 (R;US)
  - PACTOLUS;CLOTHO; nuclear power plant cost code, 8:20475 (R;US)
  - Review of active neutron-spectrometry methods for the energy range of 1 to 50 MeV, 8:22727 (R;US)
- **Hannover Univ. (Germany, F.R.). Inst. fuer Statik**
  - Application of the procedure of dynamic relaxation for the calculation of an elastically embedded spherical shell, 8:21347 (R;DE;In German)
- **Harvard Univ., Cambridge, MA (USA). Center for Astrophysics**
  - Continuum and line spectra of degenerate dwarf x-ray sources, 8:22109 (R;US)
  - Hard x-ray imaging from explorer, 8:22117 (R;US)
  - High-resolution iron-line spectroscopy, 8:21583 (R;US)
  - LAMAR: a high throughput x-ray astronomy facility for a moderate cost mission, 8:22115 (R;US)
  - Stellar coronal x-ray explorer: STCOEX, 8:22118 (R;US)
  - X-rays from quasars and active galaxies, 8:22113 (R;US)
- **Hawaii Univ.--Hilo Coll. (USA)**
  - Utilization of geothermal heat in tropical fruit-drying process, 8:20192 (R;US)
- **Hawaii Univ., Honolulu (USA)**
  - Utilization of geothermal heat in tropical fruit-drying process, 8:20192 (R;US)
- **Hawaii Univ., Manoa (USA). Hawaii Natural Energy Inst.**
  - Annual report, July 1981-June 1982, 8:20012 (R;US)
- **Health Physics Society, East Weymouth, MA (USA)**
  - Proceedings of the Health Physics Society 1981 summer school on selected topics in Reactor Health Physics, 8:20709 (R;US)
- **Hebrew Univ., Jerusalem (Israel)**
  - Introduction to fifth international workshop on mercuric iodide nuclear radiation detectors, 8:21570 (R;US)

Helsinki Univ. of Technology, Espoo (Finland). Dept. of Technical Physics
Signal coupling to thin-film SQUIDS and magnetometry without flux transformers, 8:21349 (R;US)
Heraeus (W.C.) G.m.b.H., Hanau (Germany, F.R.)
Development of a process for an inexpensive production of thin film solar cells on an industrial scale. Final report, Jul. 1980, 8:19982 (R;DE;In several languages)
History Associates, Inc., Gaithersburg, MD (USA)
Federal role and activities in energy research and development 1946-1980: an historical summary, 8:21890 (R;US)
Hochschule fuer Verwaltungswissenschaften, Speyer (Germany, F.R.)
Technical risks and law, 8:22894 (R;DE;In German)
Human Performance Technologies, Inc., Thousand Oaks, CA (USA)
Peer-review study of the draft handbook for human-reliability analysis with emphasis on nuclear-power-plant applications, NUREG/CR-1278, 8:20348 (R;US)

I

ICF, Inc., Washington, DC (USA)
Rate design analysis study module IV. Final report, Phase II, 8:20851 (R;US)
Reserve-reliability analysis study module V. Final report, 8:20849 (R;US)
User's manual for the bill comparison and usage modification programs. Rate-design analysis study module IV. Technical appendix to final report, 8:20850 (R;US)
Idaho Nuclear Corp., Idaho Falls (USA)
BURST1; hydrodynamic analysis during blowdown, 8:21412 (R;US)
IIT Research Inst., Chicago, IL (USA)
Assessment of combined effects of blast and fire on personnel survivability. Final report 3 Apr 7-31 Jan 81, 8:21660 (R;US)
Illinois Inst. of Tech., Chicago (USA)
Mechanism and kinetics of NO/sub x/ gas absorption into alkaline solutions: considerations for selectivity toward hydroxylamine, 8:21229 (R;US)
Illinois Univ., Chicago (USA). Dept. of Chemistry
Electronic structure of iron phthalocyanine and its analogs: a theoretical study, 8:21249 (R;US)
Illinois Univ., Chicago (USA). Dept. of Energy Engineering
Review of gas cleanup systems for fluidized-bed coal combustors, 8:20245 (R;US)
Illinois Univ., Chicago (USA). Dept. of Physics
Mathematical modeling of cooling-tower plumes, 8:21679 (R;US)
Illinois Univ., Urbana (USA)
Applications of nuclear reaction analysis for determining hydrogen and deuterium distribution in metals, 8:21195 (R;US)
High-energy photoproduction of rho and phi vector mesons, 8:22250 (R;US)
Neutron star binaries, pulsars and burst sources, 8:22110 (R;US)
Progress on the SLAC SNOOP diagnostic module for FASTBUS, 8:21607 (R;US)
Response of native plant individuals and communities to elevated CO_2. Progress report 1982, 8:21994 (R;US)
Illinois Univ., Urbana (USA). Dept. of Agricultural Economics
Economic balances of small scale ethanol from biomass operations, 8:19951 (R;US)
Illinois Univ., Urbana (USA). Dept. of Mechanical and Industrial Engineering
Measurement of solids motion in gas-fluidized beds. Technical progress report, 1 October 1982-31 December 1982, 8:21335 (R;US)
Illinois Univ., Urbana (USA). Dept. of Nuclear Engineering
Effects of nuclear elastic scattering and modifications of ion-electron equilibration power on advanced-fuel burns, 8:22724 (R;US)
Illinois Univ., Urbana (USA). Dept. of Physics
CODILLI; least squares analysis of resonance data, 8:22463 (R;US)
eP physics at the CBA, 8:22251 (R;US)
Illinois Univ., Urbana (USA). Fusion Studies Lab.
Tritium-assisted deuterium-based fusion breeders, 8:22702 (R;US)
Indian Inst. of Tech., Madras
^{127}I Moessbauer study of Chevrel-phase superconductors $Mo_6X_6I_2$ (X = S,Te), 8:21157 (R;US)
Indian Inst. of Tech., New Delhi
Two level multi-objective reconnaissance system study of a large water resource system. Doctoral thesis, 8:21882 (R;US)
Innsbruck Univ. (Austria)
A selected ion flow tube investigation on the quenching of N_2 (v not equal to o) by various neutrals, 8:22199 (R;AT)
Insights West, Inc., Los Angeles, CA (USA)
An assessment of vapor compression heat pump technology and applications for industrial processes. Final report Nov 80-Feb 82, 8:20975 (R;US)
Institut Economique et Juridique de l'Energie, Grenoble (France)
Development of optimization model for energy system program analysis and models of energy systems, 8:20766 (R;FR;FR)
Institute for Basic Research, Cambridge, MA (USA). Div. of Physics
Lie algebras and flexible Lie-admissible algebras. Hadronic press monographs in mathematics Number 1, 8:22590 (R;US)
Lie-admissible approach to the hadronic structure. Volume II. Covering of the Galilei and Einstein relativities. Hadronic press monographs in theoretical physics Number 2, 8:22561 (R;US)
Institute of Gas Technology, Chicago, IL (USA)
Anaerobic sludge digestion with a biocatalytic additive, 8:20998 (R;US)
Chemistry of ash deposits in the U-GAS process, 8:19421 (R;US)
Coal-gasification-process concepts, 8:19424 (R;US)
Effect of building characteristics on gas-appliance performance and end-use efficiency. Final report 1 Dec 80-31 Oct 81, 8:20917 (R;US)
Effect of impure refrigerants on evaporative chillers, 8:21333 (R;US)
Electrolyte vaporization losses from molten-carbonate fuel cells, 8:20885 (R;US)
Experimental evaluation of NO/sub x/ control using a glass tank simulator, 8:21695 (R;US)
Fluid bed consisting of fluid-bed units: a new fluidization method, 8:21190 (R;US)
Gas saturation in formation waters: Volume 1. Annual report Apr 80-Mar 81, 8:19751 (R;US)
Gas saturation in formation waters: Volume 2. Annual report Apr 80-Mar 81, 8:19752 (R;US)
Solar-assisted hydrogen generation by photoelectrocatalysis. Annual report mar 80-feb 81, 8:19915 (R;US)
Wastewater reclamation and methane production using water hyacinth and anaerobic digestion, 8:20997 (R;US)
Institute of Nuclear Energy Research, Lung-Tan (Taiwan)
EQUIPOISE3; two-dimensional, two group diffusion is slabs or cylinders, 8:22423 (R;US)
FEVER; one-dimensional, few-group diffusion depletion program, 8:20390 (R;US)
RELOAD FEVER; one-dimensional, few-group diffusion depletion, 8:20467 (R;US)
SAFE-AXISYM; stress analysis of axisymmetric load, 8:21307 (R;US)
Institute of Space and Astronautical Science, Tokyo (Japan)
X-ray astronomy program in Japan, 8:22114 (R;US)
Institutet foer Vatten- och Luftvaardsforskning, Stockholm (Sweden)
Lakes as a heat source for residential heating: a survey of costs in comparison with different systems and ecological consequences, 8:20940 (TG;US)
Institut fuer Kerntechnik und Energiewandlung e.V., Stuttgart (Germany, F.R.)
Development of a modular heat exchanger with integrated latent heat energy store. Final report, Dec. 1979, 8:20139 (R;DE;In several languages)
Input data for the Federal Republic of Germany for the energy demand model MEDEE-3, 8:20792 (R;XE)
Investigation of medium and high temperature phase change materials for thermal energy storage. Final report, Apr. 1980, 8:20140 (R;DE;In several languages)
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil)
Time delays in solar bursts measured in the mm-cm range of wavelengths, 8:22076 (R;US)
Institut Royal Meteorologique de Belgique, Brussels
Measurement of the solar constant, 8:22082 (R;US)

International Atomic Energy Agency, Vienna (Austria)
  Diversion analysis and safeguards measures for liquid-metal fast-breeder reactors. Paper IAEA-SM-260/6, 8:20421 (R;US)
  Management of wastes from uranium mining and milling, 8:19869 (R;XA)
  Radioimmunoassay and related procedures in medicine 1982, 8:21919 (R;XA)
International Coal Refining Co., Allentown, PA (USA)
  SRC-I quarterly technical report, July-September 1982, 8:19474 (R;US)
Internationale Atomreaktorbau G.m.b.H. (INTERATOM), Bergisch Gladbach (Germany, F.R.)
  Gas cooled solar power plant for generating electrical energy in the 20MWe operating range (GAST): preliminary design phase. final report, nov. 1980, 8:20050 (R;DE;In several languages)
International Harvester Co., Burr Ridge, IL (USA)
  Methanol from landfill gas: technology and economics. Final report, 8:21002 (R;US)
International Inst. for Applied Systems Analysis, Laxenburg (Austria)
  The energy supply model 'MESSAGE'. Final report, 8:20767 (R;US)
International Laser Systems, Inc., Orlando, FL (USA)
  Laser resonator, 8:21393 (R;US)
Iowa Univ., Iowa City (USA). Dept. of Physics and Astronomy
  Theoretical aspects of mirror fusion. Annual progress report, 1 July 1982-31 March 1983, 8:22603 (R;US)
Iowa Univ., Iowa City (USA). Div. of Energy Engineering
  Vacuum distillation of fuel alcohol using solar energy. Final report, 8:20088 (R;US)
Istituto Nazionale di Fisica Nucleare, Genoa (Italy)
  Triple majority coincidence with four inputs, 8:21576 (R;IT;IT)
Istituto Nazionale di Fisica Nucleare, Pavia (Italy)
  Hadron production in π^+ p, K^+ p and pp collisions at 147 GeV/c and properties of jet-like multiparticle systems, 8:22269 (R;IT)
IT-Enviroscience, Knoxville, TN (USA)
  General design study of pilot VOC control units, 8:21886 (R;US)

J

Japan Atomic Energy Research Inst., Tokai, Ibaraki. Tokai Research Establishment
  CLUP77; square cell collision probability calculations, 8:20546 (R;US)
Japan Atomic Energy Research Inst., Tokyo. Radioisotope School
  Radiological safety studies on ground disposal of radioactive wastes. Distribution and migration of radionuclides in the aerated zone, 8:19832 (R;JP;MIXED)
JAYCOR, Alexandria, VA (USA)
  Perform experiments on LINUS-O and LTX imploding liquid liner fusion systems. Final report 8 Sep 80-30 Sep 81, 8:22685 (R;US)
J.B.A., Milan (Italy)
  Survey of the Italian market on electric power systems and energy conservation equipment. Foreign market survey report, 8:20842 (R;US)
Jet Propulsion Lab., Pasadena, CA (USA)
  A method of increasing minority carrier lifetime in silicon web or the like, 8:21164 (R;US)
  Automation of the longwall mining system, 8:19608 (R;US)
  Autothermal reforming of sulfur-free and sulfur-containing hydrocarbon liquids, 8:19914 (R;US)
  Electric propulsion, 8:20950 (R;US)
  Electronic beam steering of semiconductor injection lasers, 8:21390 (R;US)
  H_2 and HD spectroscopic status, 8:22130 (R;US)
  Ion mass spectrometer, 8:21627 (R;US)
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  Optical characterization of solar concentrator mirrors using the solar beam of the JPL 25-foot space simulator, 8:20129 (R;US)
  Parabolic-dish solar-thermal power annual program review, 8:20056 (R;US)
  Phase control and beam steering of semiconductor laser arrays, 8:21391 (R;US)
  Plane flame furnace combustion tests on JPL desulfurized coal, 8:19639 (R;US)
  Plasma properties of driver gas following interplanetary shocks observed by ISEE-3, 8:22078 (R;US)
  Retrofit energy conservation in residential buildings in southern California, 8:20908 (R;US)
  Review of corrosion causes and corrosion control in a technical facility, 8:21079 (R;US)
  Steam reforming of n-hexane on pellet and monolithic catalyst beds. A comparative study on improvements due to heat transfer, 8:19781 (R;US)
  Study of reactor brayton power systems for nuclear electric spacecraft, 8:20270 (R;US)
Johns Hopkins Univ., Baltimore, MD (USA)
  Study of feasibility of detecting effects of low-dose radiation in shipyard workers. Final report, May 15-August 15, 1978, 8:21946 (R;US)
Johns Hopkins Univ., Laurel, MD (USA). Applied Physics Lab.
  OTEC: status and potential of private funding, 8:20074 (R;US)
  Power plant site evaluation - Brandon Shores site. Interim report, 8:20291 (R;US)
  Power plant site evaluation - Dickerson site. Interim report, 8:20290 (R;US)
Johns Hopkins Univ., Shady Side, MD (USA). Chesapeake Bay Inst.
  A study of the spatial variations in the non-tidal currents of the Upper Chesapeake Bay. Final report, 8:21878 (R;US)
Johns Hopkins Univ., Silver Spring, MD (USA). Applied Physics Lab.
  Annotated atlas of h-alpha synoptic charts, 8:22072 (R;US)
Joint Inst. for Lab. Astrophysics, Boulder, CO (USA)
  Coronae of nondegenerate single and binary stars: a survey of our present understanding and problems ripe for solution, 8:22108 (R;US)
  X-ray spectroscopic observations and modeling of supernova remnants, 8:22111 (R;US)
Joint Publications Research Service, Arlington, VA (USA)
  Operating principles of optico-electronic instruments, 8:21626 (R;US)

K

Kansas State Univ., Manhattan (USA). Dept. of Chemical Engineering
  Fermentative production of butanol from sorghum molasses as a potential agricultural fuel. Final report, June 26, 1981-September 25, 1982, 8:19990 (R;US)
Kansas State Univ., Manhattan (USA). Dept. of Nuclear Engineering
  CORGAM; unfolding of complex gamma-ray spectra, 8:22559 (R;US)
Karlsruhe Univ. (TH) (Germany, F.R.). Inst. fuer Beton und Stahlbeton
  Integral energy scenarios and models for the Netherlands, 8:20755 (R;NL;In Dutch)
Karlsruhe Univ. (T.H.) (Germany, F.R.). Sonderforschungsbereich Ausbreitungs- und Transportvorgaenge in Stroemungen
  Calculation of curved shear layers with two-equation turbulence models, 8:22233 (R;DE)
  Experimental investigation of cooling tower plumes. Pt. 1, 8:21814 (R;DE)
Kellogg (M.W.) Co., Houston, TX (USA)
  Atmospheric fluidized-bed combustor design whose performance will significantly exceed conventional FBC operation performance. Final report, 8:20264 (R;US)
  Recovery of calcium carbonate and sulfur from FGD scrubber waste. Final report Aug 77-Apr 78, 8:19592 (R;US)
Kentucky Dept. of Energy, Lexington (USA)
  Tri-state synfuels project commercial scale coal test. Volume 4. Coal fines utilization in furnace boilers, 8:19497 (R;US)
Kentucky Univ., Lexington (USA). Dept. of Metallurgical Engineering and Materials Science
  Method for separation of x-ray-diffraction spectra for cobalt-ZSM-catalysts, 8:19516 (R;US)
Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.)
  Chemistry of the high-temperature reactor, 8:20394 (R;DE;In German)
  Methods for the ecotoxicological evaluation of chemicals. Vol. 1, 8:21859 (R;DE;In German)

Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Festkoerperforschung
Mathematical and numerical methods for the nonlinear hyperbolic propagation problem: d^{2}GAMMA/dt^2 = d/dz [dGAMMA/dt dGAMMA/dz], 8:21493 (R;DE)
Mechanism and kinetics of radiation-induced segregation in Ni-Si alloys, 8:21048 (R;US)

Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Kernphysik
Study of the level schemes of ^{75}Se, ^{76}Se, and ^{77}Se by capture of thermal neutrons, 8:22364 (R;DE;In German)

Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Nukleare Sicherheitsforschung
Program module simulating a gas-heated steam generator with steam condensation in the primary flow channel, 8:20402 (R;DE)

Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Reaktorentwicklung
Development of a three-dimensional computer code for reconstructing power distributions by means of side reflector instrumentation and determination of the capabilities and limitations of this method, 8:20393 (R;DE;In German)

Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.)
Reaction between alcohol and nitric acid in the presence of metal nitrates, 8:21247 (TJ;DE;GE)
Technical risks and law, 8:22894 (R;DE;In German)

Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Heisse Chemie
Interfacial tension in systems involving TBP in dodecane, nitric acid, uranyl nitrate and water, 8:21231 (R;DE)

Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Projekt Prozesslenkung mit DV-Anlagen
High-speed flute grinding machine for twist drills and similar fluted tools, 8:21337 (R;DE;GE)
Pipeline leak detection and location, 8:19739 (R;DE;In German)

Ketron, Inc., Wayne, PA (USA)
Benefit-cost analysis of health and safety research and development projects in coal, metal and non-metal mining. Open file report Oct 79-Jun 81, 8:19662 (R;US)
Longwall mining principles for safely working steep coal seams. Open file report 3 Dec 79-30 Jun 81, 8:19612 (R;US)

Kiel Univ. (Germany, F.R.)
Isotopic stack - measurement of heavy cosmic ray isotopes, 8:22080 (R;US)

Kiel Univ. (Germany, F.R.). Inst. fuer Meereskunde
Population dynamics and ecology of Tilapia rendalli in Lago Sauce (Peru), 8:21931 (R;DE;In German)

Kiel Univ. (Germany, F.R.). Pharmazeutisches Inst.
Influences of environmental chemicals on the climate and biological after-effects, 8:21712 (R;DE;In German)

Kilkelly Environmental Associates, Inc., Raleigh, NC (USA)
Continuous-emission monitoring in the electric-utility industry. Final report, 8:20837 (R;US)

KM Sciences, Arlington, VA (USA)
Final report of work in support of the Nrl Fel program. Final report 14 Mar-15 Sep 82, 8:21381 (R;US)

KMS Fusion, Inc., Ann Arbor, MI (USA)
Free electron lasers for transmission of energy in space. final report, 8:21397 (R;US)

Knolls Atomic Power Lab., Schenectady, NY (USA)
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STEM; matrix generation for a system of beams, 8:21315 (R;US)
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TIGIR2; modular document information system, 8:22889 (R;US)
TUBE; u-tube heat exchanger stress analysis, 8:21319 (R;US)

Kraftanlagen A.G., Heidelberg (Germany, F.R.)
The MIT Abu El Kom solar demonstration project in Egypt. Phase a: solar thermal installations. Final report, Mar. 1980, 8:20082 (R;DE;In several languages)

Kraftwerk Union A.G., Muelheim an der Ruhr (Germany, F.R.)
Requirements for heat resistant and highly heat resistant materials in the construction of stationary turbines, 8:21062 (R;DE;In German)

KVB, Inc., Irvine, CA (USA)
Emissions from refinery process heaters equipped with low-Nox burners. Final report Oct 80-Jan 81, 8:19720 (R;US)
OD3P report. Status report, 8:21299 (R;US)

KVB, Inc., Minneapolis, MN (USA)
Thirty-day field tests of industrial boilers: site 5 - gas-fired low-Nox burner. Final report Mar 79-Mar 80, 8:21457 (R;US)
Thirty-day field tests of industrial boilers: site 6 - gas-fired fire-tube boiler. Final report mar 79-mar 80, 8:21458 (R;US)

Kyoto Univ., Kumatori, Osaka (Japan). Research Reactor Inst.
Experimental study on natural-convection boiling burnout in an annulus, 8:20684 (R;US)
KUCA critical experiments using MEU fuel (II), 8:20644 (R;US)
Liquid transfer and entrainment correlation for droplet-annular flow, 8:20683 (R;US)

L

Law Engineering Testing Co., Marietta, GA (USA)
Permeability of selected sediments in the vicinity of five salt domes in the Gulf Interior Region, 8:22034 (R;US)
Salt, caprock, and sheath study, 8:22063 (R;US)

Lawrence Berkeley Lab., CA (USA)
ANALYZE; hydrothermal reservoir test analysis, 8:20170 (R;US)
Atmospheric aerosol research. Excerpt from the Energy and Environment Division annual report, FY 1981, Chapter 4, 8:21737 (R;US)
CCC; one-phase conduction convection compaction, 8:20171 (R;US)
DEVOG; coupled molecular scattering equations, 8:22334 (R;US)
Earth Sciences Division annual report 1981, 8:22031 (R;US)
Efficient, radiation-hardened, 800-keV neutral beam injection system, 8:22739 (R;US)
Eikonal theory of the transition to phase incoherence, 8:22625 (R;US)
Energy efficiency in Chinese apartment buildings: parametric runs with the DOE.2 computer program, 8:20906 (R;US)
Erosion of hard-metal coatings, 8:21126 (R;US)
Erosion/corrosion newsletter (excerpted from LBL—13840), 8:21076 (R;US)
Expectations for old and new physics at high energy colliders, 8:22268 (R;US)
Four-layer, two-inch bore, superconducting dipole magnet, 8:21341 (R;US)

Low-noise wide-band amplifiers for stochastic beam cooling experiments, 8:21528 (R;US)
Max-IV disc cache, 8:22875 (R;US)
Methods for evaluating the DOE Appropriate-Technology Program: A review and compilation of evaluation methods, 8:20865 (R;US)
Microstructural influence on abrasive wear resistance of high-strength, high-toughness medium-carbon steels, 8:21074 (R;US)
Microstructures, transformations and properties of oxidation-resistant, iron-base, aluminum-modified alloys, 8:21073 (R;US)
Molecular-beam studies of primary photochemical processes, 8:21271 (R;US)
Neutral-particle-beam production and injection, 8:22740 (R;US)
Nuclear reactions and synthesis of new transuranium species, 8:22392 (R;US)
Nuclear-waste isolation in the unsaturated zone of arid regions, 8:19853 (R;US)
PC; coupled molecular scattering equations, 8:22335 (R;US)
Photosensitized electron transport across lipid vesicle walls, 8:20001 (R;US)
Progress in energy-efficient buildings, 8:20907 (R;US)
Ramp rate sensitivities of several superconducting dipole magnets operated in He I and superfluid He II, 8:21340 (R;US)
Selected hydrologic and geochemical issues in site characterization for nuclear waste disposal: flood basalts at the Hanford Reservation, 8:19854 (R;US)
Source, origin, and propagation of quenches measured in superconducting dipole magnets, 8:21339 (R;US)
TERZAGI; isothermal fluid flow & subsidence, 8:20173 (R;US)
WELBORE; transient wellbore fluid flow model, 8:20174 (R;US)

Lawrence Livermore National Lab., CA (USA)

Acceptance testing of two 24" lathes, 8:21357 (R;US)
Alpha Survey Meter (Engineering Materials), 8:21615 (E;US)
ANCON; space-independent reactor kinetics code, 8:20535 (R;US)
ANGCOR; directional correlation coefficients, 8:22514 (R;US)
Atomic processes in high-density plasmas, 8:22748 (R;US)
Blast attenuation in a shot tunnel using water jets, 8:21669 (R;US)
Calculation and interpretation of In-Situ measurements of initial radiations at Hiroshima and Nagasaki, 8:21935 (R;US)
Can fiber-composite flywheels increase automobile fuel economy, 8:21032 (R;US)
Comments on "Technology for the renewal of transportation infrastructure", 8:21030 (R;US)
Computer simulation of concrete penetration by shaped-charge jets, 8:21656 (R;US)
DAC1; SN perturbation code using DTF4 fluxes, 8:20525 (R;US)
3DDT; 3-dimensional multigroup diffusion xyz or r-theta-z, 8:20528 (R;US)
Decision-making in large-scale military simulation: a requirement for expert systems, 8:22823 (R;US)
Determination of static friction of beryllium to beryllium and beryllium to 1040 steel, 8:21089 (R;US)
Efficient, radiation-hardened, 800-keV neutral beam injection system, 8:22739 (R;US)
Electronics Engineering Department Computer Program Newsletter No. 8: image-processing computer codes, 8:22878 (R;US)
Electronics Engineering Department quarterly report No. 2, 1982, 8:21445 (R;US)
Energy and Technology Review, 8:22163 (R;US)
EQ3/6; chemical equilibrium of aqueous systems, 8:21154 (R;US)
Equation of state data of APC 2.5, 8:21169 (R;US)
Equipment fragility data base. Seismic Safety Margins Research Program, 8:20717 (R;US)
EXPALS; least squares exponential decay curves, 8:21289 (R;US)
Experiments on hot-electron ECRH in the Tandem Mirror Experiment-Upgrade, 8:22633 (R;US)
Explicit particle-dynamics model for granular materials, 8:21685 (R;US)
Fusion-neutron effects on magnetoresistivity of copper stabilizer materials, 8:22744 (R;US)
GENRD; free-format card input processor, 8:22842 (R;US)
H-Division quarterly report, July-September 1982, 8:22564 (R;US)
High-power microwave-pulse susceptibility of discrete semiconductor devices, 8:21621 (R;US)
ICRF pumping in the TMX-U transition region, 8:22750 (R;US)
Improbability of a resonance breakdown in quasi-optical ECRH beam systems for the Magnetic Fusion Test Facility and other mirror systems, 8:22743 (R;US)
Initial ICRF heating experiments in the TMX-U central cell, 8:22749 (R;US)
I.R. emission measurements of shocked rocket propellants by time-resolved infrared radiometry, 8:21655 (R;US)
Laser phosphate glasses, 8:21176 (TG;US)
LASL group-averaged cross-sections; SN 18- 24- and 25-group sets, 8:20548 (R;US)
Leaching study of nuclear melt glass: Part I, 8:19888 (R;US)
Line-coincidence schemes for producing laser action at soft-x-ray wavelengths, 8:21402 (R;US)
Managing information for effective use: a case study, 8:22893 (R;US)
Mechanical engineering research. Quarterly progress report, October-December 1982, 8:21354 (R;US)
Microwave generator experiment at LLNL, 8:21495 (R;US)
Neutron REM survey meter (Engineering Materials), 8:21613 (E;US)
Nonlocal Boltzmann theory of plasma channels, 8:22632 (R;US)
Particle-dynamics calculations of shear flow, 8:22234 (R;US)
PELE-IC; fluid-structure interaction analysis, 8:21417 (R;US)
PHENIX; 2-dimensional diffusion burnup refueling history, 8:20408 (R;US)
PORTABLE LISP; a list-processing interpreter, 8:22844 (R;US)
Practical heat conduction for everday problems (CE3142) (Engineering Materials), 8:21430 (E;US)
Precision-leveling surveys near the Lawrence Livermore National Laboratory site (1969 through 1980), 8:21849 (R;US)
Preliminary conceptual design study of a suppressed-fission tokamak hybrid, 8:22745 (R;US)
Processing, cure reactions, network structure and mechanical properties of TGDDM/DDS epoxies, 8:21143 (R;US)
Protecting against failure by brittle fracture in ferritic-steel shipping containers greater than four-in. thick, 8:21356 (R;US)
Reevaluation of an individual's radiation exposure at NTS in 1963-64, 8:21972 (R;US)
Report to the DOE Nuclear Data Committee, 1983, 8:22347 (R;US)
Response of porous beds to rapid gas pressurization, 8:21653 (R;US)
Review of intense-ion-beam propagation with a view toward measuring ion energy, 8:22631 (R;US)
Review of quantum Monte Carlo methods and results for Coulombic systems, 8:22565 (R;US)
Seismic hazard analysis overview and executive summary, 8:20712 (R;US)
Summary of ignition and growth modeling of shock initiation and delayed detonation in full-density and porous propellants, 8:21654 (R;US)
Technical evaluation report on the proposed technical specification change on the surveillance requirements for the response-spectrum recorder at Arkansas Nuclear One, Unit 2. (Docket No. 50-368), 8:20385 (R;US)
Technical evaluation report (Revision 1) on the proposed design modifications and technical specification changes on grid voltage degradation for the Peach Bottom Atomic Power Station, Units 2 and 3, 8:20729 (R;US)
Time-tying of EMP test data, 8:21355 (R;US)
Tritium effects on germ cells and fertility, 8:21973 (R;US)
Underground coal gasification data base, 8:19533 (R;US)
Vapor pressure of shale oil and prediction of condenser performance, 8:19785 (R;US)
VUGRAPH; plots presentation-quality viewgraphs, 8:22854 (R;US)

Lehigh Univ., Bethlehem, PA (USA). Biotechnology Research Center

New method for simultaneous saccharification and fermentation. Final report, 8:19991 (R;US)

Lehigh Univ., Bethlehem, PA (USA). Dept. of Mechanical Engineering and Mechanics

Heat transfer to tubes in freeboard space of fluidized-bed combustors. Progress report, August 1, 1982-February 1, 1983, 8:20265 (R;US)

Lehigh Univ., Stone Harbor, NJ (USA). Wetlands Inst.

Ecological studies of wood-boring bivalves in the vicinity of the Oyster Creek Nuclear Generating Station. Progress report Sep-Nov 81, 8:21876 (R;US)

Levelton (B.H.) and Associates Ltd., Vancouver, British Columbia (Canada)

Wood-waste fuels preparation and handling, 8:20014 (R;CA)

Lewis (John S.) Associates, Inc., Natick, MA (USA)

Isolated grain condensation behavior: computation methods and first results. Final report, 8:22095 (R;US)

Leybold-Heraeus G.m.b.H. und Co. K.G., Hanau (Germany, F.R.)
- Process development for large-scale production of CdS thin film solar cells sputtered copper sulfide layers and cadmium sulfide-copper sulfide heteorojunctions. Application of high rate sputtering using hot-pressed targets. Final report, 8:19980 (R;DE;In several languages)

Leybold-Heraeus G.m.b.H. und Co. K.G., Koeln (Germany, F.R.)
- Development of cryorefrigerators. Final report, September 1980, 8:21331 (R;DE;In several languages)

Little (Arthur D.), Inc., Cambridge, MA (USA)
- Break-up of oil on rough seas - simplified models and step-by-step calculations. Final report, 8:19721 (R;US)
- Engineering evaluation of radon daughter removal techniques. Open file report (final), 8:19893 (R;US)
- Evaluation of existing programs for simulation of residential building energy use. Final report, 8:20930 (R;US)
- Responses of airborne biota to microwave transmission from satellite power system. Final report, 8:22023 (R;US)
- Whey protein concentrate market enhancement. Final report, 8:20016 (R;US)

Litton Systems, Inc., Bethesda, MD (USA). Environmental Systems Div.
- Preliminary air pollution survey of hydrogen sulfide: a literature review, 8:21768 (R;US)

Lockheed-California Co., Burbank (USA)
- Accelerated development and flight evaluation of active controls concepts for subsonic transport aircraft. Volume 1: load alleviation/extended span development and flight tests. Final report, 8:20952 (R;US)

Lockheed Missiles and Space Co., Inc., Sunnyvale, CA (USA)
- Solar cell modules for plasma interaction evaluation. Final report, 8:20005 (R;US)

Lockheed Missiles and Space Co., Palo Alto, CA (USA)
- A preliminary design of the cryogenic system for the Cooled Limb Scanning Interferometer Radiometer (CLIR), phase 3. Final report, 8:21345 (R;US)
- Atmospheric emission photometric imaging, 8:22171 (R;US)
- Wolter type i LAMAR, 8:22116 (R;US)

Lockheed Missiles and Space Co., Sunnyvale, CA (USA)
- ISOTOPES; maximum yield from reaction or decay, 8:19902 (R;US)

Long Island Lighting Co., Mineola, NY (USA)
- Design and demonstration of a storage assisted air conditioning system, 8:20911 (R;US)

Los Alamos National Lab., NM (USA)
- ACSAP; resonance region cross section analysis, 8:22512 (R;US)
- Active tuning of rf cavities, 8:21527 (R;US)
- Anion exchange x-ray-fluorescence determination of uranium in plutonium, 8:21215 (R;US)
- ANSDDF; ANSI data description file utilities, 8:22890 (R;US)
- APACHE; two-dimensional chemically reactive fluid flow code, 8:21415 (R;US)
- ARRRG;FOOD; aquatic & terrestrial radiation, 8:21943 (R;US)
- BGO in several satellite-borne applications, 8:21580 (R;US)
- BNWIGL;UNIWIGL; two-group time-dependent one-dimensional diffusion, 8:22510 (R;US)
- Candidate sites for future hot-dry-rock development in the United States, 8:20149 (R;US)
- Comparison of COMPARE and BEACON subcompartment analyses of Battelle-Frankfurt containment tests, 8:20720 (R;US)
- DACRIN; radiation organ dose from inhalation, 8:21941 (R;US)
- Daily results of the initial operation of the Los Alamos salt-gradient solar pond, 8:20128 (R;US)
- Deformation of microstructures due to low-velocity particulate erosion of ductile metals by spherical particles, 8:21072 (R;US)
- DESA; district energy system cost energy model, 8:20994 (R;US)
- Economic analysis of four passive-cooling strategies for commercial office buildings, 8:19974 (R;US)
- Economics of utility oil and gas substitution: national and region-specific analysis, 8:19715 (R;US)
- Electronic structure and bonding in transuranics: comparison with lanthanides, 8:22196 (R;US)
- Energy balance and photochemical processes in the inner coma, 8:22077 (R;US)
- Energy-conservation study for the US Air Force Academy, 8:20905 (R;US)
- Evaluating the performance of passive-solar-heated buildings, 8:20097 (R;US)
- Evaluation of environmental control technologies for commercial uranium nuclear fuel fabrication facilities, 8:19881 (R;US)
- EVENT user's manual: a computer code for analyzing explosion-induced gas-dynamic transients in flow networks, 8:21439 (R;US)
- Examination of fast-reactor fuels and FBR analytical quality-assurance standards and methods. Progress report, July 1-September 30, 1982, 8:20429 (R;US)
- Explosively produced fracture of oil shale. Progress report, July-September 1982, 8:19779 (R;US)
- Extended-burnup calculations for operating-reactor reload reviews, 8:20347 (R;US)
- FESH; x-y multi-group neutron transport method, 8:22508 (R;US)
- Finite-element approach to analyzing coupled thermal-hydraulic problems, 8:21423 (R;US)
- GETOUT; radionuclide transport geologic media, 8:21870 (R;US)
- GLEN; group constant calculations from TOR output data, 8:22468 (R;US)
- GRAIL; a device-independent graphics language, 8:22860 (R;US)
- Guidelines for conservation levels and for sizing passive-solar collection area, 8:20098 (R;US)
- Heuristic introduction to gravitational waves, 8:22562 (R;US)
- HEXEREI2; HTGR thermal-hydraulic analysis, 8:20667 (R;US)
- High-efficiency free-electron laser results, 8:21388 (R;US)
- ICARUS; redundant system unavailability model, 8:20668 (R;US)
- INTEROP; nonlinear optimization algorithms, 8:22848 (R;US)
- Ka-band microwave generation using the Smith-Purcell effect, 8:21444 (R;US)
- KAPPAS; semiclassical transmission probability, 8:22340 (R;US)
- K-FIX;3D; three-dimensional extension two-phase flow dynamics, 8:20553 (R;US)
- K-TIF; two-fluid PWR downcomer fluid dynamics, 8:20351 (R;US)
- LAMPF II main-ring lattice with low transition energy, 8:21494 (R;US)
- LARCA; flux-weighting of DTF4 cross sections, 8:22486 (R;US)
- Los Alamos National Laboratory Building Cost Index, 8:21338 (R;US)
- Los Alamos portable beta-ray spectrometer, 8:21579 (R;US)
- Measurement of radioactive contaminated wastes, 8:19833 (R;US)
- Mechanistic debris-bed packing model, 8:20697 (R;US)
- Melt depth and regrowth kinetics in pulsed laser annealing of silicon and gallium arsenide, 8:21167 (R;US)
- MINX; multigroup crossections from ENDF/B-IV data, 8:22507 (R;US)
- MNN; solution of close coupling equations, 8:22339 (R;US)
- MOCARS; mc distribution & simulation limits, 8:22861 (R;US)
- Molecular mechanisms of intercellular communication: transmembrane signaling, 8:21904 (R;US)
- Multiple-scattering corrections to the Beer-Lambert law, 8:22563 (R;US)
- New method for inverting the closed-orbit distortion problem, 8:21559 (R;US)
- NJOY; neutron & photon crossections from ENDF/B, 8:22513 (R;US)
- Numerical modeling of the formation of H^- ion beams in surface-plasma sources, 8:22752 (TG;US)
- Oblique interactions of detonation waves with explosive/metal interfaces, 8:21650 (R;US)
- OCTAVIA; pressure vessel failure probabilities, 8:20573 (R;US)
- Optical instrumentation for on-line analysis of chemical processes, 8:21216 (R;US)
- PABLM; accumulated environment radiation dose, 8:21944 (R;US)
- PAD; one-dimensional coupled Sn neutronics & hydrodynamics, 8:20671 (R;US)
- PASOLE; simulation of passive solar systems, 8:20080 (R;US)
- PDFPLOT; statistical distribution functions, 8:22846 (R;US)
- PECS3; probabilistic evaluation cladding life, 8:20413 (R;US)
- Plasma properties of driver gas following interplanetary shocks observed by ISEE-3, 8:22078 (R;US)
- Proceedings of the second LAMPF II workshop, 8:21519 (R;US)
- Proceedings of the second LAMPF II workshop, 8:21524 (R;US)
- RAS; reliability analysis for phased missions, 8:20669 (R;US)
- RELAP5/MOD1/018; LWR loss of coolant analysis, 8:20673 (R;US)
- rf plasma synthesis of ultrafine, ultrapure silicon carbide powder, 8:21125 (R;US)
- SALE; analytical chemistry quality control, 8:21192 (R;US)
- SALE2D; general transient fluid flow algorithm, 8:21418 (R;US)
- SCAP; point kernel single or albedo scatter, 8:22515 (R;US)
- SCORE-EVET; three-dimensional hydraulic reactor core analysis, 8:20610 (R;US)

Sentinel Gap basalt reacted in a temperature gradient, 8:22058 (R;US)
SHAFT79; two-phase geothermal reservoir model, 8:20172 (R;US)
SOLA-LOOP; two-phase flow network analysis, 8:21416 (R;US)
SOLA-VOF; transient fluid flow free boundaries, 8:21420 (R;US)
Source terms for the initial radiations, 8:21668 (R;US)
Space nuclear power and man's extraterrestrial civilization, 8:20448 (R;US)
Space reactors. Progress report, October 1981-March 1982, 8:20447 (R;US)
Spheromak heating with Alfven waves, 8:22624 (R;US)
Studies of transport of waste radionuclides, through soil at the Maxey Flats, Kentucky, waste-burial site, 8:19885 (R;US)
SUBDOSA; external dose airborne radionuclides, 8:21942 (R;US)
SUPERENERGY2; steady-state LMFBR core analysis, 8:20415 (R;US)
SURGTANK; reactor steam surge tank dynamics, 8:20572 (R;US)
Thermal and kinematic history of mantle xenoliths from Kilbourne Hole, New Mexico, 8:22030 (R;US)
TOR; thermal scattering for crystalline materials, 8:22546 (R;US)
Transport and reactor theory. Progress report, July 1-September 30, 1982, 8:22738 (R;US)
Two parallel formulations of particle-in-cell models, 8:22623 (R;US)
TWOTRAN2; two-dimensional, multigroup transport in xy, rz, and r theta geometries, 8:22466 (R;US)
Untangling the water gas shift from Fischer-Tropsch: a Gordian knot, 8:21251 (R;US)
Uranium hydrogeochemical and stream sediment reconnaissance of the Beaver NTMS quadrangle, Alaska. National Uranium Resource Evaluation, 8:19792 (R;US)
Uranium hydrogeochemical and stream sediment reconnaissance of the Sterling NTMS quadrangle, Colorado. National Uranium Resource Evaluation, 8:19793 (R;US)
Uranium hydrogeochemical and stream sediment reconnaissance of the Ketchikan NTMS quadrangle, Alaska. National Uranium Resource Evaluation, 8:19794 (R;US)
Vegetational analysis of a canyon ecosystem at Los Alamos, 8:21843 (R;US)
VENUS2; 2-dimensional coupled neutronics-hydrodynamics, 8:20659 (R;US)
VMCON; nonlinearly constrained optimization, 8:22865 (R;US)

Los Alamos Scientific Lab., NM (USA)
DTF4; one-dimensional, multigroup discrete ordinate program, 8:22432 (R;US)
Precise source location of the anomalous 1979 March 5 gamma ray transient, 8:22149 (R;US)

Louisiana Dept. of Transportation and Development, Baton Rouge (USA). Research and Development Section
Evaluation of asphalt cement extraction and recovery methods. Final report Oct 80-Jun 82, 8:20987 (R;US)

Louisiana State Univ., Baton Rouge (USA). Coastal Studies Inst.
The effects of weather systems, currents, and coastal processes on major oil spills at sea. Technical report, 8:19722 (R;US)

Louisiana State Univ., Baton Rouge (USA). Dept. of Physics and Astronomy
Studies of sub-micron devices with emphasis on MOS systems. Progress report, July 1, 1982-June 30, 1983, 8:21441 (R;US)

Lowell Observatory, Flagstaff, AZ (USA). Planetary Research Center
Current studies of CH_3D: ye olde line drive, 8:22132 (R;US)

Lufthansa G.m.b.H., Hamburg (Germany, F.R.)
Sideslip indication system as a fuel saving aid in jet transport aircraFt operation, 8:20949 (R;DE)

M

Maine Univ., Orono (USA)
High resolution alpha spectroscopy by liquid scintillation techniques. Master's thesis, 8:21584 (R;US)

Maine Univ., Orono (USA). Land and Water Resources Center
UV disinfection for onsite sand filter effluent, 8:21884 (R;US)

Mainz Univ. (Germany, F.R.). Fachbereich Rechts- und Wirtschaftswissenschaften
Relation between the Federal Law on Immission Control and the Private Neighbours Law, 8:21818 (R;DE;In German)

Manhattan Coll., New York (USA). Dept. of Chemical Engineering
Model for fabric-filter cleaning: single-element and multiple-compartment effects, 8:21691 (R;US)

Martin Marietta Corp., Baltimore, MD (USA). Environmental Center
Long-term benthic monitoring programs for the mesohaline Chesapeake Bay. Interim report, 8:20306 (R;US)

Martin Marietta Corp., Denver, CO (USA)
Second-generation photovoltaic-concentrator-array design, 8:20020 (R;US)

Maryland Dept. of Natural Resources, Annapolis (USA). Power Plant Siting Program
Power plant cumulative environmental impact report. Final report, 8:21830 (R;US)

Maryland Univ., College Park (USA)
Generation of narrow-band tunable radiation in the 1200-A spectral region, 8:21386 (R;US)

Maryland Univ., College Park (USA). Coll. of Business and Management
Annual report to Congress, 1979. Volume 3. Projections; energy programs/energy markets-overview; energy programs/energy markets-technical papers, 8:20790 (R;US)

Maschinenfabrik Augsburg-Nuernberg (M.A.N.) A.G., Muenchen (Germany, F.R.)
Stationary flywheel energy storage systems. Final report, 8:20735 (TG;US)

Mason and Hanger-Silas Mason Co., Inc., Amarillo, TX (USA)
Corner-turning characteristics of TATB/HMX/Kel-F mixtures, 8:21651 (R;US)

Mason and Hanger-Silas Mason Co., Inc., Leonardo, NJ (USA)
Testing truck-mounted vacuum and air conveyor systems for oil spill recovery, 8:19735 (R;US)

Massachusetts Inst. of Tech., Cambridge (USA)
Conceptual design of superconducting magnet system for magnetohydrodynamic (MHD) Engineering Test Facility (ETF) 200 MWE power plant. Final report, 8:20881 (R;US)
Cross-reaction networks in the catalytic hydrodenitrogenation of synthetic liquid fuels. Quarterly report, November 1, 1982-January 31, 1983, 8:21250 (R;US)
Evolution of x-ray astronomy, 8:22137 (R;US)
Interstellar, intracluster and supercluster gas, 8:22112 (R;US)
PL-MOD; fault tree analysis by modularization, 8:22857 (R;US)

Massachusetts Inst. of Tech., Cambridge (USA). Aeroelastic and Structures Research Lab.
SABOR4; discrete-element analysis of thin shells, 8:21323 (R;US)

Massachusetts Inst. of Tech., Cambridge (USA). Dept. of Chemical Engineering
Boiling and spreading rates of instantanteous spills of liquid methane on water. Final report Sep 80-Aug 81, 8:19762 (R;US)

Massachusetts Inst. of Tech., Cambridge (USA). Dept. of Nuclear Engineering
Coolant mixing in LMFBR rod bundles and outlet plenum mixing transients. Progress report, September 1, 1981-November 30, 1981, 8:20423 (R;US)
Coolant mixing in LMFBR rod bundles and outlet-plenum mixing transients. Progress report, March 1, 1982-May 31, 1982, 8:20425 (R;US)
TDIST3; community energy consumption analysis, 8:20963 (R;US)
Wire-wrapped rod-bundle heat-transfer analysis for LMFBR, 8:20424 (R;US)

Massachusetts Inst. of Tech., Cambridge (USA). Energy Lab.
Estimation of resources and reserves. Final report, 8:19673 (R;US)
Evaluation of models for predicting evaporative water loss in cooling impoundments. Final report, 8:20275 (R;US)
Individual burner fuel/air ratio control optical adaptive feedback control system. Final report, 8:21456 (R;US)

Massachusetts Inst. of Tech., Lexington (USA). Lincoln Lab.
Effects on the utility feeder of utility-interactive inverters at the Northeast Residential Experiment Station, 8:20036 (R;US)
InP materials, 8:21147 (R;US)
Natural Bridges National Monument photovoltaic power plant: maintenance manual, 8:20034 (R;US)
Photovoltaic-system evaluation at the Northeast Residential Experiment Station. Final report, November 1980-May 1982, 8:20035 (R;US)
Remote sensing of turbine engine gases. Final report 1 Oct 80-30 Sep 81, 8:21688 (R;US)

Materials Sciences Corp., Blue Bell, PA (USA)
Thermomechanical response of gr/pi composites. Final report, 1 October 1979-30 March 1981, 8:21140 (R;US)
Mathematical Sciences Northwest, Inc., Bellevue, WA (USA)
Pacific northwest industrial energy load analysis. Final report May 81-Feb 82, 8:19760 (R;US)
Mathtech, Inc., Arlington, VA (USA)
Mini-assessment of environmental trends and problems: alternative feedstocks. Final report, 8:19687 (R;US)
Max-Planck-Gesellschaft zur Foerderung der Wissenschaften e.V., Berlin (Germany, F.R.). Fritz-Haber-Institut
Helium 2 cooling systems for long term missions in space: phase separation and hybrid cooling systems, 8:21342 (R;DE;In German)
Max-Planck-Institut fuer Physik und Astrophysik, Garching (Germany, F.R.). Inst. fuer Astrophysik
Energy balance and photochemical processes in the inner coma, 8:22077 (R;US)
Max-Planck-Institut fuer Physik und Astrophysik, Garching (Germany, F.R.). Inst. fuer Extraterrestrische Physik
Observations of fast, transient gamma ray phenomena, 8:22079 (R;DE)
Max-Planck-Institut fuer Plasmaphysik, Garching (Germany, F.R.)
Final report on the scientific and engineering design of a soft X-ray diode array diagnostic system for JET (KJ 1), 8:22622 (R;DE)
Vacuum magnetic field and modular coil system of the advanced stellarator Wendelstein VII-AS, 8:22736 (R;DE)
Max-Planck-Institut fuer Quantenoptik, Garching (Germany, F.R.)
IR laser induced reactions: temperature distributions and detection of primary products, 8:21283 (R;DE;In German)
Max-Planck-Institut fuer Stroemungsforschung, Goettingen (Germany, F.R.)
Direct investigation of hydrogen chloride elimination from 1,2-dichlorothane by laser induced radical chain reactions, 8:21272 (R;DE;In German)
Rainbow scattering of low energy Li ions on W single crystal surfaces, with special regard to the azimuthal dependence, 8:22198 (R;DE;German)
McDonnell Douglas Astronautics Co., St. Louis, MO (USA)
Materials selection for the US INTOR divertor collector plate, 8:22689 (R;US)
McDonnell Douglas Corp., Huntington Beach, CA (USA)
Development of a consensus standard for determining thermal performance of high-concentration-ratio solar collectors, 8:20135 (R;US)
McKee (Davy) Corp., Cleveland, OH (USA)
Coal-gasification basic research and cost studies. Quarterly report No. 5, 8:19432 (R;US)
McMaster Univ., Hamilton, Ontario (Canada). Dept. of Engineering Physics
PARTI; optimal group or mesh collapsing, 8:22488 (R;US)
Mechanical Technology, Inc., Albany, NY (USA)
Technology Demonstrator Engine (TDE). Period test report, August 1979-May 1981, 8:20269 (R;US)
Mechanical Technology, Inc., Latham, NY (USA)
Automotive Stirling-Engine Development Program. Semiannual technical progress report, July 1-December 31, 1981, 8:21021 (R;US)
Dynamic analysis of slurry letdown valves at H-Coal pilot plant, 8:19433 (R;US)
Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (Germany, F.R.)
Comparison of concepts for solar-heated or solar-driven absorption and compression cooling machines for air conditioning and food preservation purposes, phase 1. Final report, Nov. 1978, 8:20083 (R;DE)
Organic fluids for the practical use in energy conversion systems of solar power plants. Final report, Jun. 1980, 8:20052 (R;DE;In several languages)
Miami Univ., Coral Gables, FL (USA). Clean Energy Research Inst.
Miami international symposium on metal-hydrogen systems, 8:19929 (R;US)
Michigan Research Center, Inc., East Lansing (USA)
Evaluative studies in nuclear medicine research: positron computed tomography assessment. Final report, January 1, 1982-December 31, 1982, 8:21912 (R;US)
Michigan State Univ., East Lansing (USA)
Shape transitions at high spin, 8:22375 (R;US)
Michigan State Univ., East Lansing (USA). Dept. of Physics
Progress report and renewal proposal, 8:22370 (R;US)
Michigan Univ., Ann Arbor (USA)
CINCAS; nuclear fuel cycle cost and economics, 8:20472 (R;US)
Michigan Univ., Ann Arbor (USA). Dept. of Electrical and Computer Engineering
Investigation of special-purpose processors for real-time synthetic-aperture-focusing techniques for nondestructive evaluation of nuclear-reactor vessels and piping components, 8:20344 (R;US)
Michigan Univ., Ann Arbor (USA). School of Public Health
Performance testing of personnel dosimetry services. A revised procedures manual, 8:22541 (R;US)
Performance testing of personnel-dosimetry services. Final report of test No. 3, 8:22540 (R;US)
Middle Tennessee State Univ., Murfreesboro (USA)
Nuclear-structure studies via neutron interactions. Progress report, July 1, 1982-June 30, 1983, 8:22358 (R;US)
Miljoestyrelsen, Roskilde (Denmark). Luftforureningslab.
Annual report for 1981, 8:19598 (R;DK;In Danish)
Mineraloelwirtschaftsverband e.V., Hamburg (Germany, F.R.)
Petroleum and pollution protection, 8:19729 (R;DE;In German)
Minerals Management Service, Metairie, LA (USA). Gulf of Mexico OCS Region
Final Regional Environmental Impact Statement. Volume 2, 8:21892 (R;US)
Final regional environmental impact statement. Volume 1. Gulf of Mexico, 8:21893 (R;US)
Minerals Management Service, New York (USA). Atlantic OCS Region
Proposed 1983 outer continental shelf oil and gas lease sale offshore the Mid-Atlantic states. Final environmental impact statement, 8:19730 (R;US)
Ministere de l'Environment et du Cadre de Vie, Neuilly (France)
The operational oil pollution surveillance system being used in France: forecasted future developments in consideration of the NATO/CCMS remote sensing pilot study conclusions, 8:19726 (R;FR)
Ministerium fuer Wirtschaft, Mittelstand und Verkehr des Landes Nordrhein-Westfalen, Duesseldorf (Germany, F.R.)
KDV-pressure gasification of coal, 8:19423 (R;DE;In German)
Minnesota Univ., Minneapolis (USA). Dept. of Chemical Engineering and Materials Science
Microstructural approach to fatigue-crack processes in polycrystalline bcc materials. Annual technical progress report IV, 8:21067 (R;US)
Minnesota Univ., Minneapolis (USA). School of Public Health
Evaluation of coal mine dust personal sampler performance. Final report, 8:19663 (R;US)
Mission Research Corp., Albuquerque, NM (USA)
Improved treatment of multiple scattering of intense charged particle beams. Interim report, 8:22419 (R;US)
KMRAD: a linearized particle code for the study of resistive instabilities. Final technical report, 8:21480 (R;US)
Resistive wall instabilities in the modified betatron. Revision 1. Interim report, 8:21481 (R;US)
Standing waves and notches in a parallel-plate type of EMP simulator and their reduction. Final report, 8:21659 (R;US)
Mission Research Corp., Santa Barbara, CA (USA)
Mass fire model concept. Final report 8 Sep 80-31 May 81, 8:21664 (R;US)
Missouri State Highway Dept., Jefferson City (USA). Div. of Materials and Research
Waste products in Missouri with potential highway application. Missouri cooperative highway research program (final), 8:21007 (R;US)
Missouri Univ., Columbia (USA). Dept. of Physics
Measurement of the physical structure of coal liquids by small-angle x-ray scattering. Final technical report, April 1, 1980-March 31, 1981, 8:19556 (R;US)
Small-angle x-ray scattering studies of the porosity of coals and chars. Final technical report, Sept. 30, 1978-March 31, 1981, 8:19545 (R;US)
Missouri Univ., Rolla (USA). Dept. of Electrical Engineering
Research support for plasma diagnostics on Elmo Bumpy Torus. Observations of EBT ring geometry by means of diamagnetic field measurements using a compensated ferromagnetic

resonance magnetometer, and a preliminary numerical study of EBT flux penetration dynamics, 8:22627 (R;US)

Missouri Univ., Rolla (USA). Dept. of Nuclear Engineering
Kinetics of radiation-induced segregation in ternary alloys, 8:20419 (R;US)

Mitre Corp., McLean, VA (USA). METREK Div.
Wood-fuel use in Papua New Guinea: an assessment of industrial combustion equipment, 8:20900 (R;US)

Mobil Solar Energy Corp., Waltham, MA (USA)
Stress studies in EFG. First quarterly progress report, July 9, 1982-September 30, 1982, 8:19996 (R;US)
Stress studies in EFG. Second quarterly progress report, October 1, 1982-December 31, 1982, 8:19997 (R;US)

Monsanto Research Corp., Miamisburg, OH (USA). Mound
COLCO; thermal diffusion column coefficients, 8:19903 (R;US)
Nonliquid surface preparation for electrodeposition, 8:21077 (R;US)
Pelletized Waste Form Demonstration Program. Volume II. Description and performance, 8:19855 (R;US)
Tester design concepts for Component Test Facility, 8:21652 (R;US)

Montana Energy and MHD Research and Development Inst., Inc., Butte (USA)
High-temperature fuel-cell research and development. Final technical progress report, 1 Oct 1980-30 Sep 1981, 8:20887 (R;US)

Montana State Univ., Bozeman (USA). Agricultural Experiment Station
Selective placement of strip mine overburden in Montana. V: summary report. Open file report Jul 76-Jun 81, 8:19604 (R;US)

Motor Industry Research Association, Nuneaton (UK)
Motor vehicle energy usage: a literature survey up to the end of 1974, 8:20948 (R;US)

MSA Research Corp., Evans City, PA (USA)
Evaluation of foams for mitigating air pollution from hazardous spills. Final report 29 Oct 76-31 Jul 80, 8:21758 (R;US)

Mueller Associates, Inc., Baltimore, MD (USA)
Status of alcohol fuels utilization technology for highway transportation: a 1981 perspective. Volume II. Compression-ignition engines, 8:21012 (R;US)

Muenster Univ. (Germany, F.R.). Sonderforschungsbereich 26 Raumordnung und Raumwirtschaft
Econometrical model of the energy demand of New York State, 8:20793 (R;DE)

Myers Associates, Inc., Towson, MD (USA)
Energy conservation manual for multi-family dwellings, 8:20899 (R;US)

N

Nagoya Univ. (Japan)
Workshop on first wall coating, 8:22737 (R;JP)

Nashville Electric Service, TN (USA)
Cogeneration energy-recovery facility feasibility study: environmental rport, 8:21000 (R;US)

National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center
Aluminum blade development for the MOD-OA 200-kilowatt wind turbine. Final report, 8:20231 (R;US)
Construction of low-cost, Mod-0A wood-composite wind-turbine blades, 8:20212 (R;US)
Covering solid, film cooled surfaces with a duplex thermal barrier coating, 8:21080 (R;US)
Durability/life of fiber composites in hygrothermomechanical environments, 8:21141 (R;US)
Evaluation of inelastic constitutive models for nonlinear structural analysis, 8:21454 (R;US)
Ion beam sputter deposited diamond like films, 8:21163 (R;US)
LANDSAT remote sensing: observations of an Appalachian mountaintop surface coal mining and reclamation operation, 8:21842 (R;US)
New strategy for efficient solar energy conversion: Parallel-processing with surface plasmons, 8:20004 (R;US)
Nonlinear structural and life analyses of a combustor liner, 8:21455 (R;US)
Tank testing of a 2500-cm2 solar panel, 8:20002 (R;US)

National Aeronautics and Space Administration, Greenbelt, MD (USA). Goddard Space Flight Center
A broad-band vlf-burst associated with ring-current electrons, 8:22174 (R;US)
Accretion disk coronae, 8:22144 (R;US)
Analysis of observational spectra, 8:22094 (R;US)
Astrophysical tests for radiative decay of neutrinos and fundamental physics implications, 8:22147 (R;US)
Broad band x-ray telescope (BBXRT), 8:22119 (R;US)
Charged particle motions in the distended magnetospheres of Jupiter and Saturn, 8:22152 (R;US)
Compact objects, 8:22087 (R;US)
Complete x-ray sample of the high latitude sky from HEAO-1 A-2: log N log S and luminosity functions, 8:22139 (R;US)
Cosmology, 8:22089 (R;US)
Detectors for energies greater than 10 MeV, 8:22093 (R;US)
Detectors for energies less than 10 MeV, 8:22092 (R;US)
Diffuse radiation, 8:22090 (R;US)
Experimental and theoretical studies of interstellar grains, 8:22148 (R;US)
Extragalactic gamma radiation: use of galaxy counts as a galactic tracer, 8:22153 (R;US)
Galaxies, 8:22088 (R;US)
Gamma ray interaction processes, 8:22091 (R;US)
Gamma ray observations of the solar system, 8:22084 (R;US)
Goddard contributions to the workshop on gamma ray transients, 8:22143 (R;US)
Helium, hydrogen, and oxygen velocities observed on isee-3, 8:22158 (R;US)
Infrared absorption by OH containing compounds, 8:22098 (R;US)
Inorganic spark chamber frame and method of making the same, 8:21452 (R;US)
Laser resonator, 8:21393 (R;US)
Neutral hydrogen in elliptical galaxies with nuclear radio sources and optical emission lines, 8:22146 (R;US)
Neutrino masses, neutrino oscillations, and cosmological implications, 8:22155 (R;US)
Nuclear processes in solar flares, 8:22154 (R;US)
On the acceleration of ions by interplanetary shock waves. 1: Single encounter considerations, 8:22156 (R;US)
On the acceleration of ions by interplanetary shock waves. 3: High time resolution observations of CIR proton events, 8:22157 (R;US)
On the theory of gamma ray amplification through stimulated annihilation radiation (grasar), 8:21398 (R;US)
Planetary magnetospheres, 8:22145 (R;US)
Solar observations, 8:22085 (R;US)
Some observational tests of x-ray pulsar emission models, 8:22120 (R;US)
Spectra of cosmic x-ray sources, 8:22151 (R;US)
Spectral evolution of active galactic nuclei: a unified description of the x-ray and gamma, 8:22150 (R;US)
The interstellar medium and galactic structure, 8:22086 (R;US)

National Aeronautics and Space Administration, Hampton, VA (USA). Langley Research Center
A solar pumped laser, 8:21394 (R;US)
Analytic optical potentials for nucleon-nucleus nucleus-nucleus collisions involving light and medium nuclei, 8:22371 (R;US)
Cryogenic technology, part 1, 8:21343 (R;US)
Cryogenic technology, part 2, 8:21344 (R;US)
Design of an energy conservation building, 8:20909 (R;US)
Preliminary analysis of accelerated space flight ionizing radiation testing, 8:21142 (R;US)

National Aeronautics and Space Administration, Huntsville, AL (USA). George C. Marshall Space Flight Center
Flares and dynamic aspects, 8:22101 (R;FR;French)
Precise source location of the anomalous 1979 March 5 gamma ray transient, 8:22149 (R;US)
Satellite power system: concept development and evaluation program. Volume 4: energy conversion and power management, 8:20043 (R;US)
Satellite power system: concept development and evaluation program. Volume 7: space transportation, 8:20044 (R;US)
Statistical aspects of the 1980 solar flares. 1: Data base, frequency distributions, and overview remarks, 8:22140 (R;US)
Statistical aspects of the 1980 solar flares. 2: solar cycle activity relationships and additional remarks, 8:22142 (R;US)
Sunspot variation and selected associated phenomena: a look at solar cycle 21 and beyond, 8:22141 (R;US)

National Aeronautics and Space Administration, Moffett Field, CA (USA). Ames Research Center
- A numerical method for solving the Vlasov equation, 8:22626 (R;US)

National Aeronautics and Space Administration, Washington, DC (USA)
- Aerodynamics/ACEE: aircraft energy efficiency, 8:20953 (R;US)
- Capturing energy from the wind, 8:20202 (R;US)
- Capturing energy from the wind, 8:20230 (R;US)
- Data obtained from spacecraft, 8:22097 (R;US)
- Observations of b-type supergiants, 8:22096 (R;US)

National Air Pollution Control Administration, Raleigh, NC (USA)
- Nitrogen oxides: an annotated bibliography, 8:21764 (R;US)

National Air Pollution Control Administration, Washington, DC (USA)
- Air quality criteria for photochemical oxidants, 8:21767 (R;US)

National Atomic Energy Agency, Jakarta (Indonesia). Research Centre for Nuclear Techniques
- Neutronics analysis of the proposed 25-MW leu TRIGA Multipurpose Research Reactor, 8:20643 (R;US)
- Performance and fuel-cycle cost analysis of one JANUS 30 conceptual design for several fuel-element-design options, 8:20641 (R;US)

National Bureau of Standards, Boulder, CO (USA)
- Thermophysical properties of normal butane from 135 to 700 K at pressures to 70 MPa, 8:19770 (R;US)

National Bureau of Standards, Boulder, CO (USA). Inst. for Basic Standards
- Review of needs for thermophysical property data on solid feedstocks: 1. coal. Final report, 8:19570 (R;US)

National Bureau of Standards, Boulder, CO (USA). Thermophysical Properties Div.
- Thermophysical properties of propane from 85 to 700°K at pressures to 70 MPa, 8:19771 (R;US)

National Bureau of Standards, Washington, DC (USA)
- A simplified system for calibration of CCVTS in the substation. Final report, 8:20313 (R;US)
- Analytical and experimental analysis of procedures for testing solar domestic hot-water systems. NBS Building Science Series 140, 8:20091 (R;US)
- Development of a consensus standard for determining thermal performance of high-concentration-ratio solar collectors, 8:20135 (R;US)
- Dimensions, Volume 65, Number 3, 8:20131 (R;US)
- Dosimetry for industrial radiation processing. Final report, 8:21966 (R;US)
- Infrared absorption of sulfur bearing compounds, 8:22099 (R;US)
- Megration of low molecular weight additives in poluolefins and copolumers. Final report, 8:22004 (R;US)
- NBS: materials measurements, 8:21036 (R;US)
- Quality assurance for measurements of ionizing radiation. Annual report for FY 1982, 8:19892 (R;US)
- Report on standardization of radiation dosimetry, 8:22542 (R;US)
- Structural maps and parameters important to alloy phase stability, 8:21040 (R;US)
- Vaporization and chemical transport under coal gasification conditions, 8:19532 (R;US)
- White source use in a neutron standards laboratory. Final report, 8:22521 (R;US)

National Bureau of Standards, Washington, DC (USA). Center for Building Technology
- A study of design principles for refrigerators for low-power cryoelectronic devices, 8:21348 (R;US)
- Analysis of the calibration of metering CCVTS in a utility substation. Final report, 8:20312 (R;US)
- Building technology project summaries, 1981-1982. Special pub, 8:20931 (R;US)
- Building technology publications supplement 6: 1981. Special pub. (final), 8:20932 (R;US)
- Nontechnical summary of the final report 'optimal weatherization of low-income housing in the united states: a research demonstration project'. Final report Sep 77-Sep 81, 8:20923 (R;US)
- Optimal weatherization of low-income housing in the U.S.: a research demonstration project. Building science series (final), 8:20929 (R;US)

National Cancer Inst., Bethesda, MD (USA). International Cancer Research Data Bank
- Breast cancer: diagnosis, treatment, preclinical biology. Cancergram ct09, 8:21916 (R;US)
- Cancer detection annd management: diagnostic radiology. Cancergram ct14, 8:21918 (R;US)
- Clinical treatment of cancer: radiation therapy. Cancergram ct15, 8:21917 (R;US)
- Lung cancer: diagnosis, treatment. Cancergram ct08, 8:21915 (R;US)
- Radiation carcinogenesis. Cancergram ck06, 8:21969 (R;US)

National Center for Atmospheric Research, Boulder, CO (USA)
- The ionization state of the solar wind, 8:22161 (R;US)

National Center for Resource Recovery, Inc., Washington, DC (USA)
- Investigation of engineering and design considerations in selecting conveyors for densified refuse-derived fuel (drdf) and drdf: coal mixtures. Final report Jun 80-Sep 81, 8:19954 (R;US)

National Coal Board, Leatherhead (UK). Coal Utilization Research Lab.
- Fluidised-bed combustion. Burning coal-water mixtures in a pressurised fluidised bed: some initial results, 8:21451 (R;US)
- Fluidised-bed combustion: high-pressure combustor at Leatherhead, Test 5 - results, 8:20262 (R;US)
- Fluidised-bed combustion: high-pressure combustor at Leatherhead, Test 6 - results, 8:20263 (R;US)

National Conference of State Legislatures, Denver, CO (USA)
- Geothermal guidebook, 8:20164 (R;US)
- Legislator's guide to small-scale hydroelectric development, 8:19961 (R;US)
- National Conference of State Legislators Geothermal Project. Final report, February 1978-September 1982, 8:20165 (R;US)
- NCSL Small-Scale Hydro Project. Final report, September 1978-January 1983, 8:20835 (R;US)

National Energy Information Center, Washington, DC (USA)
- Energy Information Directory. Fourth quarter 1982, 8:20753 (R;US)

National Inst. for Metallurgy, Randburg (South Africa). Analytical Chemistry Div.
- Estimation of material variation in powdered materials. Report No. 2115, 8:21037 (R;ZA)
- Optimum opertion of a direct-reading spectrometer with excitation by a 5-kW inductively coupled plasma torch, 8:21218 (R;ZA)

National Inst. for Occupational Safety and Health, Cincinnati, OH (USA)
- Industrial hygiene walk-through survey report on RF radiation exposures from heat sealers at Hazel Incorporated, Washington, Missouri, 8:22025 (R;US)
- Mining hazard evaluation and technical assistance report no. HHF-80-109-110, Patriot Coal Company Laboratory, Kingwood, West Virginia, 8:19661 (R;US)

National Inst. for Occupational Safety and Health, Cincinnati, OH (USA). Div. of Surveillance, Hazard Evaluation and Field Studies
- Industrial hygiene survey of the General Electric Company, Hudson Falls, New York, Fort Edward, New York. Report for Jun 76-Apr 77, 8:22007 (R;US)

National Inst. for Occupational Safety and Health, Morgantown, WV (USA)
- Industrial hygiene study of TVA workers in coal-fired power plants, 8:19666 (R;US)

National Inst. of Health, Hiroshima (Japan)
- Mortality among atomic bomb survivors, October 1945-September 1964. ABCC Technical Report 6-69, 8:21667 (R;US;In English and Japanese)
- Mortality follow-up of Shirabe 1945 Nagasaki questionnaire sample, 1945-1966, 8:21666 (R;US;In English and Japanese)

National Lab. for High Energy Physics, Oho, Ibaraki (Japan)
- Tests of a resonance detector spectrometer for electron-volt spectroscopy, 8:21571 (R;US)

National Materials Advisory Board (NRC), Washington, DC (USA)
- Measurement and control of respirable dust in mines. Final report, 8:19665 (R;US)

National Measurement Lab. (NBS), Washington, DC (USA)
- Physical properties data compilations relevant to energy storage. V. Mechanical properties data on alloys for use in flywheels, 8:20734 (R;US)

National Nuclear Corp., Mountain View, CA (USA)
- Development and test of methods for the nondestructive assay of spent-fuel assemblies. Final report, 8:19807 (R;US)

National Oceanic and Atmospheric Administration, Boulder, CO (USA). Space Environment Lab.
- SMS-GOES solar soft x-ray measurements. Part I: SMS-1, SMS-2 and GOES-1 measurements from July 1, 1974 through December 31, 1976. Technical memo, 8:22159 (R;US)

SMS-GOES solar soft x-ray measurements. Part II: SMS-2, GOES-1, GOES-2 and GOES-3 measurements from January 1, 1977 through December 31, 1980. Technical memo, 8:22160 (R;US)

National Oceanic and Atmospheric Administration, Idaho Falls, ID (USA). Air Resources Lab.

Emergency response capabilities and example assessments for airborne radionuclide discharges, 8:21803 (R;US)

National Oceanic and Atmospheric Administration, Rockville, MD (USA)

Report to the congress on ocean pollution, monitoring and research October 1980 through September 1981, 8:21863 (R;US)

National Oceanic and Atmospheric Administration, Silver Spring, MD (USA). Air Resources Lab.

Atmospheric removal processes for toxic chemicals. Technical memo. report, 8:21755 (R;US)

Meteorological considerations in the development of a real-time atmospheric dispersion model for reactor effluent exposure pathway, 8:21802 (R;US)

Methods for estimating wake flow and effluent dispersion near simple block-like buildings. Technical memo, 8:21753 (R;US)

Plume diffusion modeling: annual report to the Nuclear Regulatory Commission, 8:20628 (R;US)

National Oceanic and Atmospheric Administration, Washington, DC (USA). Environmental Data and Information Service

Acid precipitation, 8:21748 (R;US)

National Oceanic and Atmospheric Administration, Washington, DC (USA). Office of Ocean Minerals and Energy

Environmental research for facilitating OTEC commercialization, 8:20076 (R;US)

OTEC: the government framework for development, 8:20077 (R;US)

National Physical Lab., Teddington (UK)

Development of optically pumped molecular dimer lasers at NPL, 8:21401 (R;GB)

Frequency dependence of a 633-nm He-Ne laser stabilized bby $^{127}I_2$, upon iodine pressure, modulation amplitude, and wall temperature, 8:21400 (R;GB)

National Research Council, Washington, DC (USA). Committee on Disposal of Excess Spoil

Disposal of excess spoil from coal mining and the Surface Mining Control and Reclamation Act of 1977: a study of regulatory requirements, engineering practices, and environmental protection objectives, 8:19591 (R;US)

National Research Council, Washington, DC (USA). Committee on Ground-Water Resources in Relation to Coal Mining

Coal mining and ground-water resources in the United States, 8:19599 (R;US)

National-Standard Co., Niles, MI (USA)

National-Standard Company waste-tire fluidized-bed-combustion boiler project. Final report, 8:20970 (R;US)

Naval Ocean Systems Center, San Diego, CA (USA)

Possible effects of noise from offshore oil and gas drilling activities on marine mammals: a survey of the literature. Final report FY 80, 8:22021 (R;US)

Naval Postgraduate School, Monterey, CA (USA)

Energy forecasting models within the Department of the Navy. Master's thesis, 8:20756 (R;US)

MOD5; stochastic model of neutron slowing-down, 8:22502 (R;US)

Offshore transport and dispersion in the California coastal region - BLM III. NPS data summary. Technical report, 8:21856 (R;US)

Naval Research Lab., Washington, DC (USA)

Electron drift in a linear magnetic wiggler with an axial guide field. Memorandum report, 8:21375 (R;US)

Equilibrium of a high current electron ring in a modified betatron accelerator. Memorandum report, 8:21482 (R;US)

Flow-induced oscillations of OTEC mooring and anchoring cables: state of the art. Final report, 8:21465 (R;US)

New measurement techniques using tracers within laser-produced plasmas, 8:22741 (R;US)

XUV and x-ray spectra from Texas Experimental Tokamak plasmas. Memorandum report 1981-1982, 8:22596 (R;US)

Naval Submarine Medical Center, Groton, CT (USA). Submarine Medical Research Lab.

Position paper: the toxic effects of chronic exposure to low levels of carbon dioxide. Interim report, 8:21988 (R;US)

Naval Surface Weapons Center, Silver Spring, MD (USA)

Physical security modeling for the shipboard nuclear weapons security program, 8:21663 (R;US)

Naval Underwater Systems Center, New London, CT (USA). New London Lab.

New York City Police Department Automated Fuel Monitoring system. Volume I. Overview. Technical report, 8:20942 (R;US)

New York City Police Department Automated Fuel Monitoring system. Volume II. Documentation report. Technical report, 8:20943 (R;US)

NCB (IEA Grimethorpe) Ltd., Grimethorpe (UK)

Fluidised Bed Combustion Project, Grimethorpe Experimental Facility, 8:20259 (R;US)

Fluidised-bed combustion: IEA Grimethorpe pressurized fluidized-bed test facility incident report - combustor water wall damage during operation on March 17, 1981, 8:20258 (R;US)

Fluidised-bed combustion: IEA Grimethorpe pressurized fluidised-bed test facility incident report - performance of the exhaust-gas heat exchangers, 8:20261 (R;US)

Fluidised-bed combustion: IEA Grimethorpe pressurized fluidised-bed test facility incident report - booster-compresser failure, 8:20260 (R;US)

IEA Grimethorpe Pressurized Fluidised Bed Test Facility incident report: history of erosion on the primary and secondary quench vessel vent valves, 8:20257 (R;US)

NEA Data Bank, 91 - Gif-sur-Yvette (France)

JUPITOR1;JP1; coupled channel x-sec evaluation, 8:22452 (R;US)

Nebraska Univ., Lincoln (USA)

Biochemical and physiological characterization of higher plants with reduced photorespiration. Progress report, March 1, 1982-March 1, 1983, 8:21909 (R;US)

Nero and Associates, Inc., Portland, OR (USA)

Quantification of environmental costs and benefits study module VI. Final report, 8:21889 (R;US)

Nevada Univ., Reno (USA). Mackay School of Mines

Proceedings: support-structure corrosion in steam generators, 8:20356 (R;US)

Newcastle upon Tyne Univ. (UK)

The role of additives in the densification of nitrogen ceramics. Annual report no. 2 (final), 8:21118 (R;US)

Newcastle upon Tyne Univ. (UK). Transport Operations Research Group

Review of the commodity flow studies (1975-1979), 8:19622 (R;US)

The inland distribution of the products of North Sea oil, 8:19740 (R;US)

Newmark, Hansen and Associates, Urbana, IL (USA)

Biochemical changes in blood components after lethal doses of radiation. Final report Oct 80-Sep 81, 8:21939 (R;US)

Theory, electro-optical design, testing, and calibration of a prototype atmospheric supersaturation, humidity, and temperature sensor. Final report Mar 81-Jul 82, 8:21938 (R;US)

New Mexico Bureau of Mines and Mineral Resources, Socorro (USA)

Contamination of ground and surface waters due to uranium mining and milling. Volume I: Biological processes for concentrating trace elements from uranium mine waters. Open file report 25 Jul 79-14 Sep 81, 8:19886 (R;US)

New Mexico Energy and Minerals Dept., Santa Fe (USA)

Preparing for possible motor-fuel shortages: a community planning guide, Grants, New Mexico, 8:20954 (R;US)

Preparing for possible motor-fuel shortages: a community planning guide, Taos, New Mexico, 8:20955 (R;US)

New Mexico Health and Environment Dept., Santa Fe (USA). Environmental Improvement Div.

Hydrologic analyses of two brine encounters in the vicinity of the Waste Isolation Pilot Plant (WIPP) Site, 8:22028 (R;US)

Review comments on Environmental Analysis Cost Reduction Proposals (WIPP-DOE-136), July 1982, 8:19816 (R;US)

New Mexico Inst. of Mining and Technology, Socorro (USA). New Mexico Petroleum Recovery Research Center

Large-scale stimulation of a low-permeability Permian Pennsylvanian, gas reservoir, 8:19765 (R;US)

New Mexico State Highway Dept., Santa Fe (USA)

Preparing for possible motor-fuel shortages: a community planning guide, Grants, New Mexico, 8:20954 (R;US)

Preparing for possible motor-fuel shortages: a community planning guide, Taos, New Mexico, 8:20955 (R;US)

New Mexico State Univ., Las Cruces (USA). Dept. of Chemical Engineering
Enhanced oil recovery by CO_2 foam flooding, 8:19681 (R;US)

New Mexico Univ., Albuquerque (USA)
Aspects of high-energy laser theory. Final report, 8:21379 (R;US)
IIR algorithms for adaptive line enhancement, 8:21631 (R;US)

New Mexico Univ., Albuquerque (USA). Computing Center
DOBIS multiple data base support as implemented at Sandia National Laboratories Technical Library, 8:22877 (R;US)

New Mexico Univ., Albuquerque (USA). Dept. of Chemical and Nuclear Engineering
Chip desorption and pore-structure effects in methane release from coal. Final report, 8:19764 (R;US)

New York State Energy Research and Development Authority, New York (USA)
Wind farm economics in the area of the city of Buffalo, 8:20208 (R;US)

New York Univ., NY (USA). Dept. of Physics
Heavy particle collisions, 8:22175 (R;US)

Niels Bohr Inst., Copenhagen (Denmark)
Nuclear shape transitions and some properties of aligned-particle configurations at high spin, 8:22374 (R;US)

Nokota Co., Bismarck, ND (USA)
Dunn-Nokota Methanol project, Dunn County, North Dakota. Volume I. Executive summary, 8:19948 (R;US)

North Carolina Central Univ., Durham (USA)
Optically pumped submillimeter-waves and applications. Final report, 8:21346 (R;US)

North Carolina State Univ., Raleigh (USA)
Long-duration thermal storage for solar-thermal high-pressure steam IPH, 8:20103 (R;US)

North Carolina State Univ., Raleigh (USA). Dept. of Chemical Engineering
Coal gasification/gas cleanup test facility: volume ii. environmental assessment of operation with devolatilized bituminous coal and chilled methanol. Final report Sep 80-Apr 81, 8:19601 (R;US)

North Carolina Univ., Chapel Hill (USA). Dept. of Environmental Sciences and Engineering
Smog chamber experiments to test oxidant related control strategy issues. Final report 1978-81, 8:21759 (R;US)

North Dakota Univ., Grand Forks (USA)
Synthesis of oligomeric models of coal derived materials for use with GPC calibration. Quarterly report, September 1982-November 1982, 8:19562 (R;US)

North Dakota Univ., Grand Forks (USA). Dept. of Chemistry
Homogeneous catalysis of lignite liquefaction with hydrogen sulfide, 8:19431 (R;US)

Northeastern Univ., Boston, MA (USA)
Probabilistic analysis for liquefaction, 8:22053 (R;US)

Northwestern Univ., Evanston, IL (USA)
Interphase transport in horizontal stratified cocurrent flow, 8:20713 (R;US)
Investigation of deep level defects in epitaxial semiconducting. Progress report, June 15, 1982-June 14, 1983, 8:21158 (R;US)

Northwestern Univ., Evanston, IL (USA). Dept. of Mechanical and Nuclear Engineering
Computer simulation of kinetic properties of plasmas. Final report, 8:22073 (R;US)

Northwestern Univ., Evanston, IL (USA). Dept. of Physics
Magnetic ordering and electronic structure of $CeAl_3$, 8:21059 (R;US)

Norwegian Air Survey Co., Oslo
Use of side looking airborne radar (SLAR) for oil pollution monitoring in norway, 8:19728 (R;FR)

Nossaman-Krueger and Knox, Washington, DC (USA)
Section 210 of PURPA and solar-thermal-energy development: the current regulatory environment and suggestions for future action. Task III report, 8:20055 (R;US)

Notre Dame Univ., IN (USA). Radiation Lab.
University of Notre Dame Radiation Laboratory quarterly report, October 1, 1982-December 31, 1982, 8:21285 (R;US)

NPS Energy Management, Inc., Washington, DC (USA)
Case studies in major bulk-power transactions, 8:20824 (R;US)
Financing new electric-generating facilities in deregulated markets: insights from analogous industries, 8:20825 (R;US)

Nuclear Assurance Corp., Atlanta, GA (USA)
U.S. reactor spent-fuel storage capabilities. Technical report, 8:20478 (R;US)

Nuclear Regulatory Commission, King of Prussia, PA (USA). Region I
NRC TLD direct radiation monitoring network: Progress report, October-December 1981. Technical report, 8:21838 (R;US)

Nuclear Regulatory Commission, Washington, DC (USA)
A collection of mathematical models for dispersion in surface water and groundwater, 8:21874 (R;US)
Advance notification of shipments of nuclear waste and spent fuel: guidance, 8:19812 (R;US)
Calculational limitations in PWR system simulation, 8:20682 (R;US)
Indexes to Nuclear Regulatory Commission Issuances, July-September 1981, 8:20459 (R;US)
NRC TLD (thermoluminescent dosimeter) direct radiation monitoring network. Technical progress report Jul-Dec 81, 8:21806 (R;US)
Nuclear property insurance: status and outlook, 8:20704 (R;US)
Nuclear Regulatory Commission Issuances, February 1982, 8:20461 (R;US)
Nuclear Regulatory Commission Issuances, January 1982, 8:20460 (R;US)
Proceedings of the topical meeting on advances in reactor physics and core thermal hydraulics, 8:20554 (R;US)
Regulatory and technical reports: compilation for first quarter 1982, January-March, 8:20451 (R;US)
Report to Congress on abnormal occurrences, October-December 1981. Quarterly report, 8:20699 (R;US)
Systematic evaluation program status summary report, April 1982, 8:20700 (R;US)
Title list of documents made publicly available: documents from October through December 1978 for Dockets 50-334 through STN 50-597, 8:20453 (R;US)

Nuclear Regulatory Commission, Washington, DC (USA). Advisory Committee on Reactor Safeguards
Review and evaluation of the Nuclear Regulatory Commission Safety Research Program for Fiscal Years 1984 and 1985, 8:20705 (R;US)

Nuclear Regulatory Commission, Washington, DC (USA). Div. of Fuel Cycle and Material Safety
Directory of Certificates of Compliance for Radioactive-Materials Packages. Certificates of Compliance, 8:19809 (R;US)
Directory of Certificates of Compliance for Radioactive-Materials Packages. Summary report of NRC approved quality assurance programs for radioactive material packages, 8:19810 (R;US)

Nuclear Regulatory Commission, Washington, DC (USA). Div. of Waste Management
User's guide for 10 CFR 61 impact analysis codes, 8:19882 (R;US)

Nuclear Regulatory Commission, Washington, DC (USA). Office of Administration
Title list of documents made publicly available, 8:20454 (R;US)

Nuclear Regulatory Commission, Washington, DC (USA). Office of Inspection and Enforcement
Agency procedures for the NRC incident response plan. Final report, 8:20703 (R;US)
Licensed fuel facility status report. Inventory difference data, January-June 1982, 8:19896 (R;US)
Standard review plan for the review and evaluation of emergency plans for research and test reactors. Technical report, 8:20462 (R;US)

Nuclear Regulatory Commission, Washington, DC (USA). Office of Management and Program Analysis
Operating reactors licensing actions summary, 8:20456 (R;US)

Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Material Safety and Safeguards
Directory of Certificates of Compliance for Radioactive-Materials Packages. Summary report of NRC approved packages, 8:19808 (R;US)
Public information circular for shipments of irradiated reactor fuel. Report for 16 Jul 79-1 May 82, 8:19811 (R;US)

Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Reactor Regulation
Integrated Plant Safety Assessment, Systematic Evaluation Program. Yankee Nuclear Power Station, Yankee Atomic Electric Company, Docket No. 50-29. Draft report, 8:20702 (R;US)

Threaded-fastener experience in nuclear power plants, 8:20331 (R;US)

Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Regulatory Research

SAMPLE; Monte Carlo uncertainty analysis code, 8:22851 (R;US)

Standards development status summary report. Quarterly report covering two periods July-December 1982, 8:20455 (R;US)

Nuclear Regulatory Commission, Washington, DC (USA). Office of Resource Management

Licensed operating reactors. Status summary report, 8:20450 (R;US)

Operating reactors licensing actions summary, 8:20457 (R;US)

Operating reactors licensing actions summary, 8:20458 (R;US)

Systematic evaluation program. Status summary report, 8:20452 (R;US)

Unresolved safety-issues summary. Aqua book, 8:20701 (R;US)

NUS Corp., Gaithersburg, MD (USA)

Area environmental characterization report of the Dalhart and Palo Duro basins in the Texas Panhandle. Volume I. Dalhart Basin, 8:19859 (R;US)

Area environmental characterization report of the Dalhart and Palo Duro basins in the Texas Panhandle. Volume II. Palo Duro basin, 8:19860 (R;US)

QLN1; quantitative gamma-ray spectra analysis, 8:21567 (R;US)

NUS Corp., San Francisco, CA (USA). Western Engineering Operations

Study of a conceptual nuclear energy center at Green River, Utah. Site selection, 8:20626 (R;US)

O

Oak Ridge Associated Universities, Inc., TN (USA)

Analysis of industrial demand for natural gas, 8:19759 (R;US)

Research report 1981-1982, 8:21914 (R;US)

Oak Ridge Associated Universities, Inc., Washington, DC (USA). Inst. for Energy Analysis

Carbon dioxide research conference: carbon dioxide, science and consensus, 8:21692 (R;US)

Oak Ridge Gaseous Diffusion Plant, TN (USA)

Comparison of analytical methods for percent phosphorous determination in electroless nickel plate, 8:21214 (R;US)

Cooling tower drift deposition measurement at the ORGDP, 8:21736 (R;US)

Oak Ridge National Lab., TN (USA)

Advanced power-conversion concepts for HVDC transmission systems, 8:20309 (R;US)

Aerosol Release and Transport Program. Quarterly progress report, July-September 1982, 8:20719 (R;US)

Age and capacity profile of electric-generation plants in the United States, 8:20852 (R;US)

Alloy development for irradiation performance. Semiannual progress report for period ending September 30, 1982, 8:22704 (R;US)

ALPHA-M; resolution of gamma-ray spectra, 8:22538 (R;US)

Assessment of parameters in the simulation of an ANFLOW municipal-wastewater-treatment pilot plant, 8:21450 (R;US)

ATHENA4; inelastic scattering form factors, 8:22560 (R;US)

Chemicals identified in feral and food animals: a data base. Volume II. Records 533-1515. Second annual report, October 1982, 8:21827 (R;US)

Chemicals identified in human biological media: a data base. Fourth annual report, October 1982, 8:21899 (R;US)

Chemicals identified in human biological media: a data base. Fourth annual report, 8:21900 (R;US)

CITATION; one-, two-, and three-dimensional diffusion depletion using multigroup theory, 8:22479 (R;US)

Comparative study of water boiling in a vertical tube under temperature-controlled or heat-flux-controlled boundary conditions, 8:20725 (R;US)

Computer data-acquisition and control system for Thomson-scattering measurements, 8:22628 (R;US)

CONCEPT5;CONCEPT3; power plant conceptual cost estimate, 8:20474 (R;US)

Coordination of physical, chemical, and thermodynamic properties for coal conversion: proceedings of the Oak Ridge conference, 8:19568 (R;US)

Dendroecological analysis of forest growth responses, 8:21991 (R;US)

District heating/cogeneration application studies for the Minneapolis-St. Paul area. Summary of Twin Cities case study and the St. Paul Project, 8:21003 (R;US)

District heating/cogeneration application studies for the Minneapolis-St. Paul area. Market assessment and economic analysis of the St. Paul district heating system, 8:21005 (R;US)

District heating/cogenertion application studies for the Minneapolis-St. Paul area. Building conversion costs and economics for the St. Paul hot water district heating market, 8:21004 (R;US)

Documentation of the reserve-related data inputs to the Resource Allocation and Mine Costing model, 8:19655 (R;US)

EDITOR; ENDF/B tape processing and editing, 8:20540 (R;US)

ESP; Monte Carlo reactor analysis calculation, 8:20545 (R;US)

EXTERMINATOR2; two-dimensional, multigroup diffusion program diffusion program, 8:22429 (R;US)

FLOCHT; computer drawn flow charts & diagrams, 8:22870 (R;US)

Geohydrological considerations in land disposal of LLW, 8:19819 (R;US)

High flux isotope reactor quarterly report, October through December, 1982, 8:20650 (R;US)

High-voltage-gradient zinc oxide varistors: fabrication and properties, 8:20310 (R;US)

Incorporation of high-level nuclear waste in gel spheres, 8:19820 (R;US)

Influence of cladding on the values of K_1 for emerging defects in the vessel belt line: semi-elliptical flaws; longitudinal flaws, 8:20733 (TG;US)

Instrumentation and Controls Division progress report, September 1, 1980-July 1, 1982, 8:21565 (R;US)

Interactive effects of acid rain and gaseous air pollutants on natural terrestrial vegetation, 8:21696 (R;US)

ISOSEARCH; isotope production flux, cross section calculations, 8:21290 (R;US)

Licensee Event Report (LER) compilation for month of January 1983, 8:20463 (R;US)

LINSED; one-dimensional multireach sediment transport model, 8:22027 (R;US)

Measurements and analysis of critical assemblies for research reactors with mixed enrichments, 8:20640 (R;US)

Meteorological effects of thermal energy releases (METER) program. Progress report, October 1980-September 1982, 8:21813 (R;US)

Methods to deal with self-selection in estimating conservation-program energy savings: use of synthetic data to test alternative approaches, 8:20912 (R;US)

Nature of stack emissions from the experimental-scale combustion of crude oil, 8:21711 (R;US)

Neutron-scattering studies of magnetic superconductors, 8:21120 (R;US)

Oak Ridge Research Reactor quarterly report, July, August, and September 1982, 8:20648 (R;US)

Opportunities for improved residential cool-storage systems, 8:20896 (R;US)

ORTEP2; crystal structure illustration plots, 8:22547 (R;US)

ORTHIS;ORTHAT; 2-dimensional heat conduction, 8:20662 (R;US)

Physical-property estimation for coal liquids, 8:19544 (R;US)

PMS1; fast neutron polarization experiment, 8:22500 (R;US)

Process for locating shallow land-burial sites for low-level radioactive waste. National Low-Level Radioactive Waste Management program, 8:19826 (R;US)

RAFFLE; first flight collision probabilities for multiple-cell geometries, 8:20517 (R;US)

REFCO8; discounted cash flow fuel cycle cost, 8:20476 (R;US)

Residential Conservation Service Program: summary of the second annual reports submitted to the US Department of Energy by states and non-regulated utilities. Final report, 8:20913 (R;US)

RICE; primary recoil atom spectra ENDF/B data, 8:22497 (R;US)

SATDSK; saturated iron magnetic field study, 8:21483 (R;US)

Short-rotation woody crops as a source of energy, 8:19983 (R;US)

SUPERTOG; ENDF/B fine-group constants generation, 8:22492 (R;US)

Survey analysis of radiation levels in the HTGR lower regions, 8:20404 (R;US)

Wilderness designation of Bureau of Land Management lands and impacts on the availability of energy resources, 8:20778 (R;US)

Oak Ridge Y-12 Plant, TN (USA)

Interactive control charts using SAS82, 8:22879 (R;US)

Reduction in airborne contamination levels at the 9201-5 Arc Melt sawing operation. A Y-12 Plant 1982 ALARA goal, 8:21805 (R;US)

Thermal profiles from electron-beam welds on uranium-6 niobium alloy, 8:21091 (R;US)

O'Brien and Gere Engineers, Inc., Syracuse, NY (USA)

Radisson community heating systems: technical and economic comparison of options. Final report, 8:21001 (R;US)

Observatoire de Nice, 06 (France)

Spectroscopic diagnostics of solar flares, 8:22102 (R;FR;French)

Observatoire de Paris, Section de Meudon, 92 (France)

Determination of magnetic fields and anisotropies of a milieu from interpretation of the linear polarization of lines, 8:22103 (R;FR;French)

Metric emissions in conjunction with solar activity, 8:22106 (R;FR;FRENCH)

The sites of solar flares, 8:22104 (R;FR;French)

Why solar flares are studied, 8:22100 (R;FR;French)

Oceanroutes, Inc., Palo Alto, CA (USA)

An evaluation of Seasat-A data in relation to optimum track ship weather routing and site specific forecasting for the offshore oil industry, 8:19725 (R;US)

Office National d'Etudes et de Recherches Aerospatiales (ONERA), 75 - Paris (France)

KrF laser pumping by electron beam discharge, 8:21389 (R;FR)

Laser techniques in chemical diagnostics, 8:21628 (R;FR)

Office of Personnel Management, Washington, DC (USA). Office of Compensation Program Development

Interim report to the President and the Congress, 8:22826 (R;US)

Office of Technology Assessment (U.S. Congress), Washington, DC

Synthetic fuels for transportation. Background Paper Number 1: the future potential of electric and hybrid vehicles, 8:21029 (R;US)

Office of the Secretary of Defense (Research and Engineering), Washington, DC (USA)

Shock, vibration and associated environments. Part III, 8:21657 (R;US)

Officine Galileo S.p.A., Florence (Italy)

Study of image processing in a photon detection assembly. Final report, 8:21629 (R;IT)

Ohio Agricultural Research and Development Center, Columbus (USA)

Ohio biomass for energy: annual potential by county, 8:20015 (R;US)

Ohio State Univ., Columbus (USA). Dept. of Agricultural Economics and Rural Sociology

Ohio biomass for energy: annual potential by county, 8:20015 (R;US)

Ohio State Univ., Columbus (USA). Dept. of Nuclear Engineering

AIM6; one-dimensional multi-group diffusion slabs, cylinders, and spherese, 8:22421 (R;US)

FORM; fast neutron spectrum cross section calculations, 8:22425 (R;US)

Okahara, Shigeoka and Associates, Inc., Hilo, HI (USA)

Utilization of geothermal heat in tropical fruit-drying process, 8:20192 (R;US)

Oklahoma City Univ., OK (USA)

Energy-pricing policies and their implications: a case study for a planned economy, 8:20770 (R;US)

Oklahoma State Univ., Stillwater (USA)

Investigations of flowfields found in typical combustor geometries, 8:21453 (R;US)

Oklahoma Univ., Norman (USA)

Seismicity and tectonic relationships of the Nemaha Uplift in Oklahoma. Part V. Final report, 8:22052 (R;US)

Old Dominion Univ., Norfolk, VA (USA)

N_2 pressure - broadened O_3 line widths and strengths near 1129.4 cm-1, 8:22203 (R;US)

Open Univ., Milton Keynes (UK)

The nuclear controversy: unequal competition in public policy-making, 8:20783 (R;GB)

Oregon Graduate Center, Beaverton (USA)

Photolysis of water for production of fuel gases. Annual report Jan-Dec 80, 8:19916 (R;US)

Oregon State Dept. of Geology and Mineral Industries, Portland (USA)

Prospects for oil and gas in the Coos Basin, western Coos, Douglas, and Lane Counties, Oregon. Oil and gas investigation 6, 8:19676 (R;US)

Oregon State Univ., Corvallis (USA). Dept. of Atmospheric Science

Inland transport, mixing, and deposition of sea-salt particles, 8:21776 (R;US)

ORI, Inc., Silver Spring, MD (USA)

Aircraft energy conservation during airport ground operations. Final report, 8:20941 (R;US)

Oxford Univ. (UK)

The solar atmosphere: from photosphere to corona, 8:22128 (R;GB)

Oxford Univ. (UK). Nuclear Physics Lab.

Terminal pumping using a turbomolecular pump as a recirculating gas compressor, 8:21529 (R;US)

The multiple scattering optical potential for scattering of electrons on he atom, 8:22204 (R;US)

P

Pacific Corrosion Research, Inc., Huntington Beach, CA (USA)

A-e Services to perform a cathodic protection survey of the bulk fuel terminals at N.S.C. Pearl Harbor, Hawaii. Volume I. Report for Aug 81-May 82, 8:19742 (R;US)

A-e Services to perform a cathodic protection survey of the bulk fuel terminals at N.S.C. Pearl Harbor, Hawaii. Volume II, 8:19743 (R;US)

Pacific Northwest Lab., Richland, WA (USA)

Application of a multi-element beta dosimeter, 8:21589 (R;US)

Aquifer thermal-energy-storage costs with a seasonal-chill source, 8:20739 (R;US)

Beta measurement evaluation and upgrade, 8:19894 (R;US)

Beta-particle measurement and dosimetry at NRC-licensed facilities, 8:21587 (R;US)

BRT1; thermal spectrum cross section calculations, 8:20497 (R;US)

Catalytic steam gasification of biomass for methanol and methane production, 8:20019 (R;US)

CLEAR: a model for the calculation of evacuation-time estimates in Emergency Planning Zones, 8:20728 (R;US)

COBRA-WC pretest predictions and post-test analysis of the FOTA temperature distribution during FFTF natural-circulation transients, 8:20727 (R;US)

Comparison of five-minute radon-daughter measurements with long-term radon and radon-daughter concentrations, 8:21745 (R;US)

2DB; two-dimensional multigroup diffusion and depletion, 8:22457 (R;US)

DBUFIT1; least squares transmutation analysis, 8:20526 (R;US)

Detection of small-sized near-surface under-clad cracks for reactor pressure vessels, 8:20594 (R;US)

1DX; one-dimensional diffusion fast cross section generation, 8:22472 (R;US)

Economics of solar, geothermal, and conventional space heating, 8:20193 (R;US)

Engineering expertise on shift in nuclear power plants: the foreign experience, 8:20316 (R;US)

Examples of MC and A systems to meet prompt accountability specifications, 8:19897 (R;US)

Existing experimental criticality data applicable to nuclear-fuel-transportation systems, 8:21350 (R;US)

FCC4; fundamental mode fast reactor cross section calculations, 8:20243 (R;US)

Feasibility of monitoring the strength of HTGR core support graphite: Part III, 8:20403 (R;US)

Field measurement and interpretation of beta doses and dose rates, 8:21971 (R;US)

Fuel-cladding mechanical interaction in PCI-resistant LWR fuel designs during normal operation and power-ramping. Fuel-Performance Improvement Program, 8:20327 (R;US)

GAMTEC2; multigroup constant calculations for 0 to 10 MeV, 8:22431 (R;US)

GSSLRN1B; least squares photopeak spectra code, 8:20527 (R;US)

Guidelines for nuclear-power-plant safety-issue-prioritization information development, 8:20718 (R;US)
HRG3; slowing-down spectrum, multigroup constants, 8:20531 (R;US)
Identification and comparative genotoxicity of polycyclic aromatic hydrocarbons and related nitrogen-containing heteroatomic species in products from coal liquefaction processes, 8:19667 (R;US)
Illustration of environmental fate modeling on a micro-computer, 8:21865 (R;US)
Inhalation exposure study of a solvent-refined-coal material, 8:22008 (R;US)
Inland transport, mixing, and deposition of sea-salt particles, 8:21776 (R;US)
Investigation of flow recirculation in a rod bundle during natural-convection flow and power transients, 8:20726 (R;US)
Iodine transport predicted for a postulated steam-line break with concurrent ruptures of steam-generator tubes, 8:20716 (R;US)
ISOGEN; radionuclide generation and decay, 8:19905 (R;US)
MAP3S Precipitation Chemistry Network: fifth periodic summary report (1981), 8:21774 (R;US)
MCC-1: a standard leach test for nuclear waste forms, 8:21165 (R;US)
New look at turbulence experienced by a rotating wind turbine, 8:20234 (R;US)
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Observations of drainage winds on a simple slope, 8:21684 (R;US)
Operations requirements of utilities with wind-power generation, 8:20235 (R;US)
Performance testing of beta dosimeters used at Department of Energy facilities, 8:21588 (R;US)
PERT4; two-dimensional perturbation in xy, rz, and r-theta geometry, 8:20506 (R;US)
Potpourri of deposition and resuspension questions, 8:21775 (R;US)
Relevance of biotic pathways to the long-term regulation of nuclear waste disposal. Topical report on reference eastern humid low-level sites, 8:19884 (R;US)
REPP; thermal-hydraulic water reactor design, 8:20322 (R;US)
Results of simulated abnormal heating events for full-length nuclear fuel rods, 8:19813 (R;US)
Siting guidelines for utility application of wind turbines. Final report, 8:20214 (R;US)
Strength changes in vanadium and titanium irradiated with 14-MeV neutrons, 8:21083 (R;US)
Treatment of biomass gasification wastewater using a combined wet air oxidation/activated sludge process, 8:20018 (R;US)
United States Department of Energy aquifer thermal-energy-storage field-test facilities, 8:20740 (R;US)
User's manual for geophysical well-logging software programs, 8:22054 (R;US)
UT200; DEC emulation of CDC 200 user terminal, 8:22863 (R;US)

Pacific Sierra Research Corp., Santa Monica, CA (USA)
Users' manual for SNAP/D: seismic network assessment program for detection. Final report, 8:22036 (R;US)

Panclor S.p.A., Milan (Italy)
Design and construction of electrolyzers with solid electrolyte using Nafion membranes. Final report, 8:19913 (R;XE)

Paris-11 Univ., 91 - Orsay (France)
Excitation of nitrogen in a luminous discharge, 8:22197 (R;FR;French)

Parks (Richard W.), Seattle, WA (USA)
Energy use and customer welfare effects of residential time-of-use rates. Final report, 8:20838 (R;US)

PEDCo-Environmental, Inc., Cincinnati, OH (USA)
Acid rain: control strategies for utility boilers. Volume II. Appendices, 8:19578 (R;US)
EPA utility FGD survey: July-September 1981. Quarterly report, 8:20297 (R;US)
EPA utility FGD survey, October-December 1981. Volume I. Categorical summaries of FGD systems. Volume II. Design and performance data for operational FGD system. Quarterly report, 8:20307 (R;US)

Pennsylvania State Univ., University Park (USA)
Collision induced sharp features in the infrared spectrum of HD, 8:22131 (R;US)
Plane flame furnace combustion tests on JPL desulfurized coal, 8:19639 (R;US)
Redeposition of the sputtered surface in limiters, 8:22691 (R;US)

Pennsylvania State Univ., University Park (USA). Applied Research Lab.
Efficiency improved turboprop. Technical memo, 8:21010 (R;US)
Variation of the pinning force with microstructure and with the Ginzburg-Landau parameter in type II superconductors. Technical memo, 8:21038 (R;US)

Pennsylvania State Univ., University Park (USA). Coal Research Section
Data base for the analysis of compositional characteristics of coal seams and macerals. Final report. Part 2. A multivariate study of the interrelationships among selected variables of the organic fraction of samples of United States' coals, 8:19555 (R;US)

Pennsylvania State Univ., University Park (USA). Dept. of Materials Science and Engineering
Laser micropyrolysis of coal macerals. Annual report Oct 80-Sep 81, 8:19569 (R;US)

Pennsylvania State Univ., University Park (USA). Pennsylvania Cooperative Fishery Research Unit
Probable effects of acid precipitation on Pennsylvania waters, 8:21864 (R;US)

Pennsylvania Univ., Philadelphia (USA). Dept. of Materials Science and Engineering
Atomistic studies of grain boundaries with segregated impurities. Progress report, Jul 1, 1982-Jun 30, 1983, 8:21066 (R;US)
Mechanisms of damage accumulation in time-dependent cyclic deformation. Progress report, January 1, 1982-December 31, 1982, 8:21068 (R;US)

Pennsylvania Univ., Philadelphia (USA). Dept. of Physics
Experimental studies of the geometric and electronic structure of chemisorption binding. Final report Feb 80-Jan 81, 8:21219 (R;US)

Perkins and Will, Inc., Washington, DC (USA)
Evaluation of the physical condition of public housing stock. Volume I: final report. Final report, 8:20935 (R;US)
Evaluation of the physical condition of public housing stock. Volume 4: energy conservation, 8:20936 (R;US)

Physical Sciences, Inc., Andover, MA (USA)
Synthetic-fuel combustion: pollutant formation. Soot-initiation mechanisms in burning aromatics. Final report, 19 September 1980-18 September 1982, 8:21296 (R;US)

Pittsburgh Univ., PA (USA)
Surface studies of WO_3/Al_2O_3 and $Ni/W/Al_2O_3$ catalysts, 8:21230 (R;US)

Pittsburgh Univ., PA (USA). Dept. of Chemical and Petroleum Engineering
Particle-size effects in oxidation of pyrite in air/water chemical coal cleaning. Final report, March 1, 1979-February 29, 1980, 8:19553 (R;US)
Seventh annual international conference on coal gasification, liquefaction, and conversion to electricity, 8:19401 (R;US)

Podlasek (R.J.), Springfield, IL (USA)
Analysis of state regulatory actions regarding rates for buyback electricity and back-up electric service for natural gas cogeneration. Final report, 8:20803 (R;US)

Princeton Univ., NJ (USA)
New theoretical and experimental methods for pessure broadened linewidths and their interpretation, 8:22201 (R;US)

Princeton Univ., NJ (USA). Dept. of Chemical Engineering
Photoionization of molecular clusters. Final report 1 May 78-30 Sep 81, 8:21262 (R;US)

Princeton Univ., NJ (USA). Dept. of Physics
Beta decay rate of $^{16}N(0^-$, 120 keV): meson exchange currents and the value of the induced pseudoscalar-coupling constant, 8:22352 (R;US)

Princeton Univ., NJ (USA). Plasma Physics Lab.
Neutral-particle-beam production and injection, 8:22740 (R;US)
Physical sputtering code for fusion applications, 8:22694 (R;US)

Prins Maurits Lab. TNO, Rijswijk (Netherlands)
Pollution of the soil by aviation gasoline, 8:19736 (R;NL;In several languages)
Porous polymers as new sorptive materials, 8:21467 (R;NL)
Solar power systems smaller than 500 W for military use, 8:20045 (R;NL;In several languages)

Public Service Co. of New Hampshire, Manchester (USA)
Small-Scale Hydroelectric Power Demonstration Project. Public Service Company of New Hampshire Drop No. 1 power plant

expansion of Garvins Falls hydroelectric plant. Final technical and construction cost report, 8:19960 (R;US)

Public Service Electric and Gas Co., Newark, NJ (USA)
- Modeling and computerized characterization of lead-acid battery discharges. Battery Energy Storage Test (BEST) Facility, 8:20748 (R;US)
- SCOPE: the BEST facility data analysis and reporting system. Battery Energy Storage Test (BEST) Facility, 8:20749 (R;US)

Public Technology, Inc., Washington, DC (USA)
- Environmental services: energy conservation in wastewater treatment (a case study from the urban consortium), 8:21006 (R;US)

Purdue Univ., Lafayette, IN (USA)
- CINCAS; nuclear fuel cycle cost and economics, 8:20472 (R;US)
- Nuclear shape transitions and some properties of aligned-particle configurations at high spin, 8:22374 (R;US)
- Shape transitions at high spin, 8:22375 (R;US)

Purdue Univ., Lafayette, IN (USA). Dept. of Agronomy
- Sensitivity of soil regions to acid precipitation, 8:21829 (R;US)

Purdue Univ., Lafayette, IN (USA). Dept. of Nuclear Engineering
- MACH1; one-dimensional, multigroup diffusion is slabs, cylinders, and spheres, 8:22439 (R;US)

Purdue Univ., Lafayette, IN (USA). School of Electrical Engineering
- Development of a reduced-order functional representation of an alternator-rectifier excitation system, 8:20240 (R;US)

Purdue Univ., Lafayette, IN (USA). School of Mechanical Engineering
- Measurement of radical species concentrations and polycyclic aromatic hydrocarbons in flames by fluorescence and absorption using a tunable dye laser. Progress report, March 1, 1982-February 28, 1983, 8:21295 (R;US)

Purvin and Gertz, Inc., Dallas, TX (USA)
- Dunn-Nokota Methanol Project, Dunn County, North Dakota. Volume IV. Product transportation analysis, 8:19949 (R;US)

Pyros, Inc., Gaithersburg, MD (USA)
- Final report for technical, scientific, engineering support to the Office of Fossil Energy, 8:19399 (R;US)

Q

Queen Mary Coll. Industrial Research Ltd., London (UK)
- Documentation for the QMC generic LP modelling system. Final report, 8:22874 (R;XE)
- Energy LP modelling prospects for NDF hydrogen. Final report, 8:19931 (R;GB)

R

Radian Corp., Austin, TX (USA)
- Ammonium sulfate and bisulfate formation in air preheaters. Final report Oct 80-Oct 81, 8:20278 (R;US)
- Impact of Nox selective catalytic reduction processes on flue gas cleaning systems. Final report Oct 80-Oct 81, 8:20304 (R;US)
- Simulated heat-exchanger tubes: DOE Geothermal Test Facility, East Mesa, California. Corrosion test report, 8:20175 (R;US)
- Studies of flue gas desulfurization at Louisville Gas and Electric's Paddy's Run Station: Volume I. Carbide and commercial lime testing. Final report Mar 75-Feb 1978, 8:20302 (R;US)
- Studies of flue gas desulfurization at Lousiville Gas and Electric's Paddy's Run Station: Volume II. Review and analysis of commercial operations. Final report Mar 75-Feb 1978, 8:20303 (R;US)

Radian Corp., McLean, VA (USA)
- Source test and evaluation report: alcohol facility for gasohol production. Final reportoct 78-feb 80, 8:19950 (R;US)

Radiation Effects Research Foundation, Hiroshima (Japan)
- Mortality among atomic bomb survivors, October 1945-September 1964. ABCC Technical Report 6-69, 8:21667 (R;US;In English and Japanese)
- Mortality follow-up of Shirabe 1945 Nagasaki questionnaire sample, 1945-1966, 8:21666 (R;US;In English and Japanese)

RAND Corp., Santa Monica, CA (USA)
- Effects of lease size on yields from oil-shale surface mines, 8:19788 (R;US)
- Projected engineering cost estimates for an Ocean Thermal Energy Conversion (OTEC), 8:20073 (R;US)
- The effects of lease size on yields from oil shale surface mines, 8:19780 (R;US)
- Uncertainty in estimating power-plant closure costs: A review of 'Economic impact of closing Zion nuclear facility,' a report by the Comptroller General of the United States, 8:20465 (R;US)

RCA Labs., Princeton, NJ (USA)
- Studies of single-mode injection lasers and of quaternary materials. Volume 1: Single-mode constricted double-heterojunction AlGaAs diode lasers. Final report, 4 Feb. 1980 - 15 May 1981, 8:21395 (R;US)
- Studies of single-mode injection lasers and of quaternary materials. Volume 2: Measurement of electro-optic effects in InGaAsP junction waveguides. Final report, 4 Feb. 1980 - 15 May 1981, 8:21396 (R;US)

Reactor Research Centre, Kalpakkam (India). Reactor Physics Section
- APARNA2; one-dimensional integral neutron transport in slab geometries, 8:22511 (R;US)

REAP Associates, Inc., Washington, DC (USA)
- Federal energy conservation programs. Perspectives from the public and private sectors: Volume I. Summary of a public hearing, July 14 and 15, 1981, Washington, DC, 8:20786 (R;US)
- Federal energy conservation programs. Perspectives from the public and private sectors: Volume II. Public hearing, July 14 and 15, 1981, Washington, DC, 8:20787 (R;US)

Regensburg Univ. (Germany, F.R.)
- Wind turbine value analysis for electric utilities, 8:20207 (R;US)

Regulatory Council, Washington, DC (USA)
- Cooperation and conflict: regulating coal production. Final report, 8:20812 (R;US)
- The automobile calendar: recent and pending federal activities affecting motor vehicles. Final report, 8:20804 (R;US)

Rensselaer Polytechnic Inst., Troy, NY (USA)
- Theory of heavy-ion collisions. Final report, 8:22397 (R;US)

Rensselaer Polytechnic Inst., Troy, NY (USA). Dept. of Materials Engineering
- Experimental test to unify sintering theory. Progress report, 8:21123 (R;US)

Research Establishment Risoe, Roskilde (Denmark)
- SBI low energy house model 79 - with a 410 mm cavity brick wall, 8:20937 (R;DK;In Danish)

Research Inst. of National Defence, Umea (Sweden)
- Control of the intensimeter RA 73 used in Switzerland, 8:21574 (R;SE;SW)
- Formation and spreading of explosive and toxic gas clouds. A study of the literature, 8:19761 (R;SE;In several languages)

Research Triangle Inst., Durham, NC (USA)
- State-of-the-art assessment: shelter habitability. Final report Oct 81-Sep 82, 8:22896 (R;US)

Research Triangle Inst., Research Triangle Park, NC (USA)
- Evaluation of system variables in stage II refueling operations. Final report, 8:21766 (R;US)
- Techniques to determine a company's ability to conduct a quality stack test. Technical assistant document, 8:21752 (R;US)

Resource Planning Associates, Inc., Cambridge, MA (USA)
- Potential for industrial cogeneration development by 1990. Executive summary, 8:20968 (R;US)

Resources for the Future, Inc., Washington, DC (USA)
- Strategic petroleum reserve: progress after seven years, 8:19746 (R;US)

Rice Lake, City of, WI (USA)
- Alternate vehicle fuel for small fleet. Final technical report, September 28, 1981-December 24, 1982, 8:21034 (R;US)

Rochester Univ., NY (USA). Inst. of Optics
- Nonlinear optics with broad-band lasers. Progress report, July 15, 1982-July 14, 1983, 8:21387 (R;US)

Rocket Research Co., Redmond, WA (USA)
- Application of thermal energy storage to process heat recovery, Phase III, heat exchanger evaluation, 8:20964 (R;US)

Rockwell International Corp., Canoga Park, CA (USA). Energy Systems Group
Commercial high-level-waste management: options and economics. A comparative analysis of the ceramic and glass waste forms, 8:19822 (R;US)
Process description and plant design for preparing ceramic high-level waste forms, 8:19821 (R;US)

Rockwell International Corp., Golden, CO (USA). Energy Systems Group
Small-wind-systems zoning issues and approaches, 8:20205 (R;US)

Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant
Actinide removal from waste solutions by ferrite treatment, 8:19863 (R;US)
Chemical systems engineering progress report, January-December 1981, 8:19802 (R;US)
Galvanic corrosion of metals and coatings when coupled to uranium in severe environments, 8:21085 (R;US)
PVD by electron-beam processes, 8:21084 (R;US)
Wind systems life cycle cost analysis: a description and users manual, 8:20209 (R;US)
Wind-systems technical notes: 1981, 8:20236 (R;US)

Rockwell International Corp., Golden, CO (USA). Wind Energy Research Center
Interfacing a Gemini synchronous (line-commutated) inverter with a local utility and a mini-grid: test results, 8:20237 (R;US)

Rockwell International Corp., Richland, WA (USA). Energy Systems Group
Basalt Waste Isolation Project drilling and testing. Quarterly report, April 1, 1982-June 30, 1982, 8:19864 (R;US)
Basalt Waste Isolation Project drilling and testing. Quarterly report, July 1, 1982-September 30, 1982, 8:19865 (R;US)
Radionuclide sorption on basalt-interbed materials. Annual report FY 1981, 8:19887 (R;US)

Rockwell International Corp., Richland, WA (USA). Rockwell Hanford Operations
CPDREV; spare parts inventory control system, 8:22824 (R;US)
Geology of the Wallula Gap Area, Washington, 8:22035 (R;US)

Rockwell International Corp., Thousand Oaks, CA (USA). Science Center
Development of polyphase ceramics for the immobilization of high-level Defense nuclear waste, 8:19823 (R;US)

Rogers, Golden and Halpern, Inc., Reston, VA (USA)
Gulf of Mexico summary report 3. A revision of Outer Continental Shelf oil and gas activities in the Gulf of Mexico and their onshore impacts: Gulf of Mexico summary report 2, August 1981, 8:19683 (R;US)

Ross (Bernd) Associates, San Diego, CA (USA)
Development of an all-metal thick film cost affective metallization system for solar cells, 8:20010 (R;US)
Development of an all-metal thick film cost effective metallization system for solar cells, 8:20009 (R;US)

Royal Inst. of Tech., Stockholm (Sweden)
High frequency probe circuits for plasma diagnostics, 8:22630 (R;SE)
Plasma phase of the evolution of the solar system, 8:22126 (R;SE)
Very strong double layers in a magnetized plasma column, 8:22629 (R;SE)

Royal Signals and Radar Establishment, Malvern (UK)
Anomalous reflectivity losses of coated mirrors used in the infrared, 8:21086 (R;GB)

S

Sandia National Labs., Albuquerque, NM (USA)
Analysis, scale modeling, and full-scale tests of low-level nuclear-waste-drum response to accident environments, 8:19814 (R;US)
Antireflection pyrex envelopes for parabolic solar collectors, 8:20132 (R;US)
Approach to resolution of geologic uncertainty in the licensing of a high-level-waste repository in tuff, 8:19868 (R;US)
Basic data report for drillhole AEC 8 (Waste Isolation Pilot Plant - WIPP), 8:19866 (R;US)
Bechgaard salts: magnetotransport, dimensionality, spin-density waves, and the threshold field, 8:22558 (R;US)
Bonding wire for semiconductor-element use, 8:21447 (TG;US)
Computing minimum cost fire protection, 8:21353 (R;US)
Development of an ice-penetration model, 8:21464 (R;US)
DOBIS multiple data base support as implemented at Sandia National Laboratories Technical Library, 8:22877 (R;US)
Effects of oxygen, salt, and pH level on corrosion rate of drill-stem steel, 8:20183 (R;US)
Electronic properties of superlattices, 8:21166 (R;US)
FC;LSEI;WNNLS; constrained least squares fit, 8:22859 (R;US)
Geothermal versus conventional drilling, 8:20184 (R;US)
High-average-power electron accelerators for generating gigawatt microwave pulses, 8:21477 (R;US)
IIR algorithms for adaptive line enhancement, 8:21631 (R;US)
In-situ stress variations and hydraulic-fracture containment in layered rock: observations from a mineback experiment, 8:19767 (R;US)
Interaction of electromagnetic pulse with commercial nuclear-power-plant systems. Volume I. Executive summary, 8:20722 (R;US)
Interaction of electromagnetic pulse with commercial nuclear-power-plant systems, 8:20723 (R;US)
Laboratory technique for simulation of projectile penetration into geological targets, 8:21351 (R;US)
LPMGB; linear programming subroutine with bounds, 8:22862 (R;US)
MARIAH - a finite-element computer program for incompressible porous-flow problems: user's manual, 8:21427 (R;US)
Melt depth and regrowth kinetics in pulsed laser annealing of silicon and gallium arsenide, 8:21167 (R;US)
Natural-convection experiments in a liquid-saturated porous medium bounded by vertical coaxial cylinders, 8:19867 (R;US)
New designs and installations of photovoltaic-array fields with low balance-of-system costs, 8:20048 (R;US)
ORVIS: optically recording velocity interferometer system. Theory of operation and data-reduction techniques, 8:21630 (R;US)
PAMA; preferred acquisition method analysis, 8:22849 (R;US)
PATH1 self-teaching curriculum: example problems for Pathways-to-Man Model, 8:19883 (R;US)
Proceedings of the second PFN uranium logging seminar, 8:21639 (R;US)
Proceedings of the workshop on nuclear-power-plant aging, 8:20574 (R;US)
PV concentrator array power costs, 8:20046 (R;US)
Relationships between the sol-to-gel and gel-to-glass conversions, 8:21168 (R;US)
SANDIA-ORIGEN; isotope generation & depletion, 8:19901 (R;US)
Second-generation photovoltaic-concentrator-array design, 8:20020 (R;US)
SOLCEL2; simulation of photovoltaic systems, 8:20031 (R;US)
Sol-gel derived AR coatings, 8:20134 (R;US)
Subsidence prediction for high-extraction mining using complementary influence functions, 8:19613 (R;US)
Surface chemical information from electron- and photon-stimulated desorption, 8:21273 (R;US)
Tactical Improvement and Security Force Evaluation Program, 8:20317 (R;US)
Thermal analysis of a linear infrared lamp, 8:21352 (R;US)
USA program in geothermal drilling and completion research and development, 8:20182 (R;US)

Sandia National Labs., Livermore, CA (USA)
Application of complex equilibrium calculations to the study of mineral matter during coal combustion, 8:19642 (R;US)
Fundamental combustion and diagnostics research at Sandia. Progress report, October-December 1982, 8:21302 (R;US)
HEATMESH; geometrical data heat transfer study, 8:21328 (R;US)

San Diego Unified School District, CA (USA)
Integrated solar heating, cooling and hot water system for the San Diego City Schools, University City High School (Engineering Materials), 8:20117 (E;US)

San Francisco Univ., CA (USA)
Radiation environment mapping, 8:21801 (R;US)

Sante Fe Corp., Alexandria, VA (USA)
Estimated maintenance and repair requirements for coal-fired propulsion systems. Final report, 8:21014 (R;US)

Schonberg Radiation Corp., Mountain View, CA (USA)
Portable linear accelerator development. Final report, 8:20328 (R;US)

Science and Engineering Research Council, Chilton (UK). Rutherford Appleton Lab.
A high throughput inelastic neutron scattering spectrometer for the Harwell linac and the spallation neutron source, 8:21585 (R;US)
Electron excitation in atoms and molecules by neutron-nucleus scattering, 8:22372 (R;US)

Science Applications, Inc., Boulder, CO (USA)
Field manual for oil spills in cold climates. Final report Sep 78-May 79, 8:19733 (R;US)

Science Applications, Inc., Chatsworth, CA (USA). Combustion Science and Advanced Technology Dept.
Spray combustion of synthetic fuels. Phase II. Spray-combustion phenomena. First quarterly report, 1 October 1981-1 January 1982, 8:19934 (R;US)

Science Applications, Inc., Fort Collins, CO (USA)
Evaluation of EL836 explosive stimulation of Devonian gas shale, 8:19763 (R;US)

Science Applications, Inc., La Jolla, CA (USA)
Radiation field characterization for the AFRRI TRIGA Reactor. Volume I. Baseline measurements and evaluation of calculational data. Final report 5 May 80-31 Dec 80, 8:20631 (R;US)

Science Applications, Inc., McLean, VA (USA)
Soviet post-strike civil defense rescue, damage-limiting, repair and restoration operations. Final report 13 aug 81-12 aug 82, 8:21661 (R;US)

Science Applications, Inc., Oak Ridge, TN (USA)
Wilderness designation of Bureau of Land Management lands and impacts on the availability of energy resources, 8:20778 (R;US)

Science Applications, Inc., Salt Lake City, UT (USA)
Conceptual Nuclear Energy Center at Green River, Utah. Volume 1. Environmental impacts, 8:20624 (R;US)

Science Applications, Inc., Steamboat Springs, CO (USA)
Material properties of Devonian shale for stimulation-technology development, 8:19768 (R;US)
Mechanical properties of Devonian shales from the Appalachian Basin, 8:19769 (R;US)

Scientific Systems, Inc., Cambridge, MA (USA)
Determination of material properties by limited scan x-ray tomography. Final technical report Sep 79-Jan 81, 8:21911 (R;US)

Sealed Insulating Glass Manufacturers Association, Chicago, IL (USA)
Field correlation of performance standards for organically sealed sinsulating glass, 8:20933 (R;US)

Sea Loft Restaurant, Long Branch, NJ (USA)
Solar preheating of both domestic hot water and space. Final technical report for the Sea Loft restaurant in Long Branch, New Jersey, 8:20087 (R;US)
Solar preheating of both domestic hot water and space. Final technical report for the Sea Loft restaurant in Long Branch, New Jersey (Engineering Materials), 8:20111 (E;US)

Secretaria de Asentamientos Humanos y Obras Publicas, Mexico City (Mexico)
(seminario usos de la energia solar en la vivienda) solar energy applications for dwellings. Seminar 17-19 nov 80, 8:19976 (R;US)

Semix, Inc., Gaithersburg, MD (USA)
Semicrystalline casting process development and verification. Quarterly progress report number 8, March 19, 1982-June 19, 1982, 8:19988 (R;US)

Sentralinstitutt for Industriell Forskning, Oslo (Norway)
Well control in case of offshore blowout: collecting oil in the water. New concept based on using a separate underwater work base and a collection unit. Final report Oct 80-Mar 81, 8:19690 (R;US)
Well control in case of offshore blowout: oil collection on platforms. Final report, 8:19688 (R;US)

Serice de la Programmation de la Politique Scientifique, Brussels (Belgium)
National energy research and development program, 8:20800 (R;BE;FR)

Sheff (James R.) Co., Richland, WA (USA)
NOISY1; auto- and cross-spectral densities, 8:20536 (R;US)

Siemens A.G., Muenchen (Germany, F.R.)
Laser diode. Final report, May 1980, 8:21385 (R;DE;In several languages)
Optical pumped neodymium miniature laser transmitter. Final report, October 1978, 8:21384 (R;US;In several languages)

Siemens A.G., Neustadt b. Coburg (Germany, F.R.)
Crosslinking of polyolefin insulation of cables and insulated wires by the use of energy-rich radiation. Part 1: material of irradiation. Final report, March 1980, 8:21276 (R;US;In several languages)
Crosslinking of polyolefin insulations of cables and insulated wires by the use of energy-rich radiation. Part 3: production engineering. Final report, March 1980, 8:21277 (R;DE;In several languages)

Sloan-Kettering Inst. for Cancer Research, New York (USA)
Biomedical research with cyclotron-produced radionuclides. Progress report, August 1, 1982-February 28, 1983, 8:21913 (R;US)

Solarelectronics, Inc., Bellingham, MA (USA)
Flat-plate solar array project. Task 1: silicon material: investigation of the hydrochlorination of $SiCl_4$, 8:20008 (R;US)
Investigation of the hydrochlorination of $SiCl_4$. Quarterly report, October 9, 1982-January 8, 1983. Flat-Plate Solar-Array Project, Advanced-Materials Research Task, 8:19995 (R;US)

Solar Energy Industries Association, Washington, DC (USA)
Impediments to capital formation in solar-thermal-energy systems, 8:19971 (R;US)
Solar industry index. The comprehensive guide to manufacturers and service organizations, 8:19966 (R;US)

Solar Energy Research Inst., Golden, CO (USA)
Analysis of the potential of the electrofluid dynamic wind-driven generator, 8:20238 (R;US)
Beer's-law-based, simple spectral model for direct normal and diffuse horizontal irradiance, 8:19970 (R;US)
Conceptual design of the Truscott Brine Lake solar pond system. Volume II. Utility-integrated scenario, 8:20138 (R;US)
Detailed design procedure for solar industrial-process-heat systems: overview, 8:20104 (R;US)
Development of a consensus standard for determining thermal performance of high-concentration-ratio solar collectors, 8:20135 (R;US)
Development of SOLIPH - a detailed computer model of solar industrial-process-heat systems, 8:20105 (R;US)
Direct steam generation in line-focus solar collectors, 8:20136 (R;US)
Ethanol production using microbial cells trapped in polyacrylamidegels, 8:19986 (R;US)
Evaluation of air-cooled central receivers, 8:20068 (R;US)
Evaluation of solar domestic-hot-water control systems, 8:20107 (R;US)
Fermentation of soluble cello-oligosaccharides by yeasts, 8:20023 (R;US)
Flash evaporation from turbulent water jets, 8:20078 (R;US)
Fourier-transform approach to building simulations with thermostatic controls, 8:20938 (R;US)
Fuel-gas production from animal and agricultural residues and biomass. Anaerobic Digestion Program, 8:19937 (R;US)
Long-duration thermal storage for solar-thermal high-pressure steam IPH, 8:20103 (R;US)
Photo/biological hydrogen program progress reports, 8:19919 (R;US)
Research and development project evaluation and selection methods for the Solar-Thermal-Technology Program, 8:20069 (R;US)
Simple energy-calculation method for solar industrial-process-heat steam systems, 8:20106 (R;US)
Technology and economics of close-coupled gasifiers for retrofitting gas/oil combustion units to biomass feedstock, 8:19956 (R;US)
Testing of a prototype Fresnel-lens concentrator for thermal applications, 8:20137 (R;US)
Thermochemical energy transport in a 1-MW industrial-process-heat solar system, 8:20102 (R;US)
WECS; wind energy value to electric utilities, 8:20206 (R;US)
Windmill wake turbulence decay: a preliminary theoretical model, 8:20239 (R;US)

Solar Environmental Engineering Co., Inc., Fort Collins, CO (USA)
SOLCOST3.0; solar heating & cooling design, 8:20081 (R;US)

Solarex Corp., Rockville, MD (USA)
Solarex final report: design and fabrication of a prototype system for a photovoltaic residence in the Southwest, 8:20037 (R;US)

South African Atomic Energy Board, Pretoria
- AIREK3; space-independent kinetics with feedback, 8:20492 (R;US)
- BLAST; reactor kinetics temperature distribution study, 8:20516 (R;US)
- WELWING; material buckling cylindrical fuel elements, 8:20603 (R;US)

South Carolina Univ., Columbia (USA). Coll. of Engineering
- General approach to the testing of binary solubility systems for thermodynamic consistency. Consolidated Fuel Reprocessing Program, 8:21232 (R;US)

South Coast Technology, Inc., Ann Arbor, MI (USA)
- Review and evaluation of automotive fuel conservation technologies. Final report, 8:21017 (R;US)

Southeastern Louisiana Univ., Hammond (USA). Coll. of Business
- Technological response to environmental protection regulations and energy price/supply structure: a case study of chlorine/caustic soda manufacturing. Executive summary report 1 Jul 79-30 Jun 81, 8:20985 (R;US)

Southern California Gas Co., Los Angeles (USA)
- Experimental evaluation of NO/sub x/ control using a glass tank simulator, 8:21695 (R;US)

Southern Illinois Univ., Carbondale (USA). Coal Extraction and Utilization Research Center
- Mining/reclamation handbook project. Final technical report, September 1980-February 1983, 8:19597 (R;US)

Southern Research Inst., Birmingham, AL (USA)
- Sampling for high-molecular-weight organic compounds in power plant stack gases. Final report, 8:20301 (R;US)

Southern Services, Inc., Atlanta, GA (USA)
- HEATING2; transient steady-state heat transfer, 8:21407 (R;US)

Southwest Engineering Associates, El Paso, TX (USA)
- Analysis, scale modeling, and full-scale tests of low-level nuclear-waste-drum response to accident environments, 8:19814 (R;US)

Southwestern Public Service Co., Amarillo, TX (USA)
- Harrington Station Unit 2 fabric filter system special testing report. Final report Dec 78-Jul 81, 8:20296 (R;US)

Southwest Research Inst., San Antonio, TX (USA)
- Characterization of diesel emissions from operation of a light-duty diesel vehicle on alternate source diesel fuels, 8:21762 (R;US)
- Characterization of diesel emissions from operation of a light-duty diesel vehicle on alternate source diesel fuels. Final report Jun 80-Oct 81, 8:21763 (R;US)
- Characterization of exhaust emissions from methanol- and gasoline-fueled automobiles. Final report Jun 81-Mar 82, 8:21033 (R;US)

Southwest Research Inst., San Antonio, TX (USA). Army Fuels and Lubricants Research Lab.
- Assessment/review of methanol technology and utilization as a fuel. Interim report Oct 81-Sep 82, 8:19945 (R;US)

Spire Corp., Bedford, MA (USA)
- Hermetic edge sealing of photovoltaic modules. Quarterly technical report, 8:19998 (R;US)

SRI International, Menlo Park, CA (USA)
- Development and demonstration of a reverse-osmosis energy-recovery device. Final report, 8:20984 (R;US)
- Electrochemical measurement of corrosion rates in cathodically protected systems. Final report, 8:21070 (R;US)
- Exploratory study of coal-conversion chemistry. Quarterly report No. 6, August 19, 1982-November 18, 1982, 8:19515 (R;US)
- Fire and the related effects of nuclear explosions. 1982 Asilomar Conference, 8:21670 (R;US)
- Monitoring techniques for pH, hydrogen, and redox potential in nuclear-reactor circuits, 8:20370 (R;US)
- Scale-model turbine-missile-casing impact tests. Final report, 8:20691 (R;US)

Stanford Linear Accelerator Center, CA (USA)
- Alpha magnet assembly (Engineering Materials), 8:21550 (E;US)
- Breakdown of QCD factorization theorems for inclusive reactions, 8:22320 (R;US)
- Bunch monitor-standard drift section (Engineering Materials), 8:21541 (E;US)
- CAT Scanner Electron Gun (Engineering Materials), 8:21923 (E;US)
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- Crate verifier module (Engineering Materials), 8:21619 (E;US)
- Electron gun SLAC Model 5-3 (Engineering Materials), 8:21538 (E;US)
- Electron gun SLAC model 5-3 (Engineering Materials), 8:21549 (E;US)
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- Layout, SLAC accelerator injector system (Engineering Materials), 8:21543 (E;US)
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- Photon-photon collisions, 8:22272 (R;US)
- Power-supply-operations group-training programs, ac/dc power systems and micellaneous information, 8:20308 (R;US)
- Proceedings of Summer Institute of Particle Physics, July 27-August 7, 1981: the strong interactions, 8:22301 (R;US)
- Profile monitor (at Accelerator Sections 28-9 and 29-9) (Engineering Materials), 8:21533 (E;US)
- Progress on the SLAC SNOOP diagnostic module for FASTBUS, 8:21607 (R;US)
- Quark-antiquark bound-state spectroscopy and QCD, 8:22303 (R;US)
- Review of $e^+ e^-$ physics at PEP - 1982, 8:22273 (R;US)
- RF particle separator for the SLAC linear accelerator's positron source (Engineering Materials), 8:21532 (E;US)
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- Selected SLAC vacuum control units (Engineering Materials), 8:21548 (E;US)
- SHAM: Liquid Argon Sample and Hold Module (Engineering Materials), 8:21561 (E;US)
- SLAC 38 MW pulsed Klystron, Model XK-5 (Engineering Materials), 8:21537 (E;US)
- SLAC Accelerator Section-Injector (Engineering Materials), 8:21545 (E;US)
- SLAC high-current electron gun (Engineering Materials), 8:21544 (E;US)
- SLAC hybrid power divider (Engineering Materials), 8:21551 (E;US)
- SLAC positron-source station Mark II (Engineering Materials), 8:21531 (E;US)
- SPORT-SPEAR Mark III Electronics (Engineering Materials), 8:21618 (E;US)
- Storage ring design optimization for FEL operation, 8:21560 (R;US)
- Subharmonic buncher section (SLC) (Engineering Materials), 8:21539 (E;US)
- Summary talk for the Brookhaven spin physics conference, 1982, 8:22276 (R;US)
- Testing GUTs: where do monopoles fit, 8:22302 (R;US)
- Vacuum system electronics for main injector fast valve control and beam shut off: system schematic SS 101-010-00 (2 shts) (Engineering Materials), 8:21547 (E;US)

Stanford Univ., CA (USA)
Axial field limitations in MHD generators. Part 2: Analytical investigation and comparison with experiments, 8:20880 (R;US)
First results from DELCO at PEP, 8:22270 (R;US)
Geological and geothermal investigations for HCMM-derived data. Final report, June 1977 - June 1981, 8:22042 (R;US)
Structure of the solar oscillation with period near 160 minutes, 8:22138 (R;US)
The differential emission measure of dynamic coronal loops, 8:22136 (R;US)

Stanford Univ., CA (USA). High Temperature Gasdynamics Lab.
Effects of core nonuniformities on the performance of MHD generators. HTGL report No. 234, 8:20875 (R;US)
Suppression of turbulence in combustion-driven magnetohydrodynamic flows, 8:20876 (R;US)

Statens Provningsanstalt, Boraes (Sweden)
Evaluation of filter-tape analyzing devices, part 1, 8:21777 (R;SE;In several languages)
Evaluation of filter-tape analyzing devices, part 2, 8:21778 (R;SE;SE)
Fire extinguishing tests -80 with methyl alcohol gasoline, 8:19935 (R;US;MIXED)

Statens Raad foer Byggnadsforskning, Stockholm (Sweden)
Energy and the built environment, 8:20927 (R;US)
Seasonal thermal storage: Swedish practice, developments and cost projections, 8:20738 (R;US)

State Univ. of New York, Stony Brook (USA)
Design and demonstration of a storage assisted air conditioning system, 8:20911 (R;US)

State Univ. of New York, Stony Brook (USA). Marine Sciences Research Center
Lagrangian and Eulerian diffusion study in the coastal surface layers. Final report, 1 July 1979-30 September 1982, 8:21852 (R;US)

Stevens Inst. of Tech., Hoboken, NJ (USA)
Studies of magnetism and exchange scattering in solids using synchroton radiation and spin-polarized photoemission. Progress report, June 1, 1982-May 31, 1983, 8:22191 (R;US)

Stuttgart Univ. (Germany, F.R.)
Load flow optimization in an electrical energy network by means of a searching technique with random numbers, 8:20271 (R;DE;In German)
Production of liquid fuels out of plant biomass and refuse: Methods, cost, potential, 8:20003 (R;US;MIXED)

Stuttgart Univ. (Germany, F.R.). Fakultaet Elektrotechnik
Interaction of electromagnetic radiation and micro-structured matter with respect to the generation of spectral selective solar absorbers, 8:20130 (R;DE;GE)

Stuttgart Univ. (Germany, F.R.). Inst. fuer Statik und Dynamik der Luft- und Raumfahrtkonstruktionen
Static and dynamic investigations for the model of a wind rotor, 8:20216 (R;DE)

Stuttgart Univ. (TH) (Germany, F.R.). Inst. fuer Aerodynamik und Gasdynamik
Rotor blade profiles for wind turbines, 8:20232 (R;DE;In German)

Styrelsen foer Teknisk Utveckling, Stockholm (Sweden)
Energy production from waste heat by means of elastomers or memory metals, 8:20993 (TG;US)

Suntech, Inc., Marcus Hook, PA (USA)
Highway binder materials from cellulosic and related wastes. Final report, 8:20982 (R;US)

Synergic Resources Corp., Bala-Cynwyd, PA (USA)
Documentation of the reserve-related data inputs to the Resource Allocation and Mine Costing model, 8:19655 (R;US)

Synergy, Inc., Washington, DC (USA)
Review of FRS and complementary pipeline data, 8:19753 (R;US)

Synsis, Inc., Los Angeles, CA (USA)
Supplied-air respirator system for underground coal miners (instruction manual), 8:19664 (R;US)

Syracuse Univ., NY (USA)
Research program in elementary particle theory. Progress report for the period ending June 30, 1983, 8:22245 (R;US)

Syracuse Univ., NY (USA). Dept. of Chemical Engineering and Materials Science
Selective metal-ion extraction for multiple metal-ion liquid-liquid exchange reactions. Progress report, February 1, 1982-January 31, 1983, 8:21198 (R;US)

Systems Control, Inc., Palo Alto, CA (USA)
Operations requirements of utilities with wind-power generation, 8:20235 (R;US)

T

Tata Energy Research Inst., Bombay (India). Documentation Centre
Review of the literature on promotion of windpumps, 8:20233 (R;IN)

Technische Hochschule Aachen (Germany, F.R.)
Crosslinking of polyethylene in view of an application in wire coating. Final report, December 1979, 8:21248 (R;DE;In several languages)

Technische Hochschule Aachen (Germany, F.R.). Fakultaet fuer Bergbau und Huettenwesen
Measured data acquisition in an externally heated rotory kiln lignite gasification system, 8:19531 (R;DE;In German)

Technische Hochschule Darmstadt (Germany, F.R.)
Differential charging model of solar panels, 8:20039 (R;DE)

Technische Hogeschool Delft (Netherlands)
Some aspects of two-phase flow, heat transfer and dynamic instabilities in medium and high pressure steam generators, 8:21424 (R;US)

Technische Hogeschool Delft (Netherlands). Afdeling Technische Natuurkunde
Control and dispersion of hazardous gas clouds with water sprays, 8:21440 (R;NL)

Technische Univ. Berlin (Germany, F.R.). Fachbereich Bergbau und Geowissenschaften
Determination of lateral inhomogeneities in seismics by means of inversion of transit time anomalies, 8:22050 (R;DE;In German)

Technische Univ. Braunschweig (Germany, F.R.). Fakultaet fuer Maschinenbau und Elektrotechnik
Evaluation of transient heat transfer in parallel tube bundles by the Monte-Carlo-Method, 8:21425 (R;DE;In German)
Using parallel-computer systems to evaluate the dynamical protection of power networks, 8:20272 (R;DE;In German)

Technische Univ. Muenchen (Germany, F.R.). Fakultaet fuer Maschinenwesen
Heat transfer through transparent and non-transparent outer walls with a curtain of adjustable light shades, 8:20910 (R;DE;In German)

Technische Univ., Vienna (Austria)
Contribution to the determination of J-integral and crack opening displacement as material characteristics and their application in safety-assessments of pressure vessels, 8:21432 (R;AT;In German)

Technology for Energy Corp., Knoxville, TN (USA)
Voids in neutron-irradiated metals and alloys, 8:21041 (R;US)

Teknekron, Inc., Berkeley, CA (USA)
Distributing the risks of interbasin water transfers under drought conditions: the dilemma posed by coal slurry pipelines, 8:19623 (R;US)

Teledyne Engineering Services, Waltham, MA (USA)
Continued investigation of the failure of Midland Unit 1 RPV anchor studs: data report, 8:20383 (R;US)
Continued investigation of the failure of Midland Unit 1 RPV anchor studs analysis report, 8:20384 (R;US)

Teledyne Geotech, Alexandria, VA (USA). Seismic Data Lab.
A statistical discrimination experiment for eurasian events using a twenty-seven-station network. Technical report, 8:21673 (R;US)

Temple, Barker and Sloane, Inc., Lexington, MA (USA)
Electric-utility financial database documentation, 8:20836 (R;US)

Tennessee Energy Authority, Nashville (USA)
Tennessee energy statistics quarterly, third quarter 1982, 8:19719 (R;US)

Tennessee Univ., Knoxville (USA)
Comparison of three years of performance for air-to-air parallel solar-heat-pump system in TECH House IV, 8:20085 (R;US)
Evaluation of solar-assisted heat pumps and solar house. Final report, June 1, 1977-September 30, 1981, 8:20110 (R;US)

Tennessee Univ., Knoxville (USA). Dept. of Physics and Astronomy
Nuclear spectroscopic studies. Progress report, June 1, 1982-May 31, 1983, 8:22343 (R;US)

Tennessee Valley Authority, Chattanooga (USA)
LASER; spectrum calculations with burnup cylindrical lattice, 8:20499 (R;US)
UPD; source deck maintenance utility routine, 8:22847 (R;US)

Tennessee Valley Authority, Chattanooga (USA). Div. of Energy Conservation and Rates
Nashville solar-water-heater demonstration project. Monitoring-data analysis. Interim report, September 1981-November 1981, 8:20108 (R;US)

Tennessee Valley Authority, Chattanooga (USA). Div. of Fossil and Hydro Power
Fossil steam reliability & availability. Quarterly status report, 8:20283 (R;US)

Tennessee Valley Authority, Chattanooga (USA). Div. of Power Production
Availability and reliability improvement program, 8:20282 (R;US)

Tennessee Valley Authority, Chattanooga (USA). Office of Natural Resources
Microprocessor-controlled ion selective electrode determination of total chlorine. Final report, 8:20279 (R;US)

Tennessee Valley Authority, Knoxville (USA). Div. of Energy Conservation and Rates
Nashville Solar-Water-Heater Demonstration Project. Monitoring data analysis interim report, December 1981-February 1982, 8:20109 (R;US)

Tennessee Valley Authority, Knoxville (USA). Office of Economic and Community Development
Floods on North Toe River and Kentucky Creek in the vicinity of Newland, North Carolina. Flood report, 8:21883 (R;US)

Tennessee Valley Authority, Muscle Shoals, AL (USA). Div. of Agricultural Development
Optimization of biological recycling of plant nutrients in livestock waste by utilizing waste heat from cooling water, 8:21855 (R;US)

Tennessee Valley Authority, Norris (USA). Div. of Land and Forest Resources
Transportation methods and costs for sawlogs, pulpwood bolts, and longwood, 8:20960 (R;US)
Users manual for YIELD: timber-yield forecasting and planning tool, Version 1.2, 8:21932 (R;US)

Tennessee Valley Authority, Norris (USA). Office of Natural Resources
Comparable Sale Data Base users manual. Version 1.1, 8:21933 (R;US)
User's manual for the TVA lumber yield and value program (LYVP). Version 1.0, 8:21934 (R;US)

TERA Corp., Englewood, CO (USA)
Information system for generation availability: executive summary. Final report, 8:20839 (R;US)

Tetra Tech, Inc., Lafayette, CA (USA)
Assessment methodology for new cooling lakes. Volume 1. Methodology to assess multiple uses for new cooling lakes. Final report, 8:20266 (R;US)
Assessment methodology for new cooling lakes. Volume 2. Development of empirical multivariate relationships for evaluating fish communities in new cooling lakes. Final report, 8:21853 (R;US)

Texas A and M Univ., College Station (USA). Center for Energy and Mineral Resources
Fuel-conservation efforts of Texas municipal, 8:20944 (R;US)

Texas A and M Univ., College Station (USA). Center for Tectonophysics
Mechanical and transport properties of rocks at high temperatures and pressures. Task III. Technical progress report Number 3, 1 March 1982-30 October 1982, 8:22057 (R;US)

Texas A and M Univ., College Station (USA). Dept. of Chemical Engineering
Simple model of Exxon's Zn/Br_2 battery, 8:20752 (R;US)

Texas Energy and Natural Resources Advisory Council, Austin (USA)
Texas energy history, 8:20794 (R;US)

Texas Engineering Experiment Station, College Station (USA)
Basic research opportunities for lasting fuel gas supplies from inorganic resources. Final report 15 Feb 81-28 Feb 82, 8:19917 (R;US)

Texas Gas Transmission Corp., Owensboro, KY (USA)
Anaerobic sludge digestion with a biocatalytic additive, 8:20998 (R;US)

Texas Research and Development Foundation, Austin (USA)
Vehicle operating costs, fuel consumption, and pavement type and condition factors. Final report Sep 79-Oct 81, 8:20775 (R;US)

Texas Univ., Austin (USA)
Kinetic studies following state-selective laser excitation. Progress report, March 15, 1981-March 14, 1983, 8:22190 (R;US)

Texas Univ., Austin (USA). Center for Research in Water Resources
Appropriate technology for planning hydroelectic power projects in Nepal: the need for assumption analysis. Technical report, 8:19962 (R;US)

Texas Univ., El Paso (USA)
Geotectonics of South America, 8:22046 (R;US)
The crustal structure and tectonics of South America, 8:22045 (R;US)

Texas Univ., Richardson (USA)
Investigation of the effects of external current systems on the MAGSAT data utilizing grid cell modeling techniques, 8:22043 (R;US)

Thermo Electron Corp., Waltham, MA (USA)
High-efficiency, gas-fired heat-pipe, warm-air heating system. Final report on phase 1, Jun 79-Jun 81, 8:20918 (R;US)

Tokyo Univ. (Japan)
Investigation from Japanese MAGSAT team. Part a. crustal structure near Japan and in antarctic station. Part b. electric currents and hydromagnetic waves in the ionosphere and the magnetosphere, 8:22041 (R;JP)
Space experiments with particle accelerators, 8:22170 (R;US)

Toledo Edison Co., OH (USA)
System for automated diagnosis of reactor-coolant pumps, 8:20352 (R;US)

Toledo Univ., OH (USA). Dept. of Physics and Astronomy
Semi-empirical studies of atomic structure. Progress report, 1 July 1982-1 February 1983, 8:22599 (R;US)

Toronto Univ., Ontario (Canada)
Modelling of polymer photodegradation for solar cell modules, 8:20006 (R;US)
Modelling of polymer photodegradation for solar cell modules, 8:20007 (R;US)

Toulouse-3 Univ., 31 (France). Centre d'Etude Spatiale des Rayonnements
Precise source location of the anomalous 1979 March 5 gamma ray transient, 8:22149 (R;US)

Transport and Road Research Lab., Crowthorne (UK)
Energy consumption of an electric, a petrol and a diesel powered light goods vehicle in central london traffic. Final report for 1978, 8:20956 (R;US)
Vehicle operating costs in the Caribbean: an experimental study of vehicle performance, 8:21016 (R;US)

Trans Systems Corp., Vienna, VA (USA)
Assessment of battery buses and battery technology. Final report Aug 81-May 82, 8:21028 (R;US)

TRC Environmental Consultants, Inc., East Hartford, CT (USA)
Air-pollution damage to man-made materials: physical and economic estimates. Final report, 8:20773 (R;US)

Tri-County Metropolitan Transportation District of Oregon, Portland (USA)
Noise reduction retrofit for a 'new look' GMC transit bus: service bulletin. Final report Apr 80-Nov 81, 8:21020 (R;US)

Tri-State Synfuels Co., Houston, TX (USA)
Tri-State Synfuels Project Coal Sampling and Testing Program: Volume 1. Sampling and results, 8:19550 (R;US)
Tri-State Synfuels Project Coal Sampling and Testing Program: Volume 2. Analytical testwork, 8:19551 (R;US)
Tri-State Synfuels Project Commercial Scale Coal Test: Volume 2A. Collection and shipment mine, barge, ship and train programs, 8:19492 (R;US)
Tri-State Synfuels Project Commercial Scale Coal Test: Volume 2B. Collection and shipment analytical testwork, 8:19493 (R;US)
Tri-State Synfuels Project Commercial Scale Coal Test: Volume 3A. Gasification test at Sasolburg, overview, 8:19496 (R;US)
Tri-State Synfuels Project Commercial Scale Coal Test: Volume 1. Selection of camp 1 coal, 8:19549 (R;US)
Tri-State Synfuels Project Commercial Scale Coal Test: Volume 5. Kentucky stockpile tests, 8:19500 (R;US)

  - Tri-State Synfuels Project Commercial Scale Coal Test: Volume 6A. Export sample program/wastewater treatability study summary report, 8:19502 (R;US)
  - Tri-State Synfuels Project Commercial Scale Coal Test: Volume 2C. Collection and shipment photographic review, 8:19610 (R;US)
  - Tri-State Synfuels Project Review: Volume 13. Coal sampling and testing, 8:19552 (R;US)
  - Tri-State Synfuels Project Review: Volume 14. Commercial scale coal test, 8:19512 (R;US)
  - Tri-State Synfuels Project Review: Volume 8. Commercial status of licensed process units, 8:19504 (R;US)
  - Tri-State Synfuels Project Review: Volume 2. Engineering and process summary, 8:19494 (R;US)
  - Tri-State Synfuels Project Review: Volume 5. Engineering costs, budgets and schedules, 8:19535 (R;US)
  - Tri-State Synfuels Project Review: Volume 6. Environmental, health, safety and socioeconomic review, 8:19501 (R;US)
  - Tri-State Synfuels Project Review: Volume 12. Fluor project status, 8:19511 (R;US)
  - Tri-State Synfuels Project Review: Volume 10. Narrative specification, 8:19507 (R;US)
  - Tri-State Synfuels Project Review: Volume 7. Permitting, environmental impact statement and related environmental information, 8:19503 (R;US)
  - Tri-State Synfuels Project Review: Volume 3. Process evaluation, selection and design, 8:19495 (R;US)
  - Tri-State Synfuels Project Review: Volume 4A. Design engineering, 8:19498 (R;US)
  - Tri-State Synfuels Project Review: Volume 11A. Engineering and processing alternatives, 8:19508 (R;US)
  - Tri-State Synfuels Project Review: Volume 1A. Executive summary and overall project review, 8:19489 (R;US)
  - Tri-State Synfuels Project Review: Volume 9A. Subcontract information, 8:19505 (R;US)
  - Tri-State Synfuels Project Review: Volume 4B. Design engineering, 8:19499 (R;US)
  - Tri-State Synfuels Project Review: Volume 1B. Executive summary and overall project review, 8:19490 (R;US)
  - Tri-State Synfuels Project Review: Volume 11B. Process development studies, 8:19509 (R;US)
  - Tri-State Synfuels Project Review: Volume 9B. Subcontract information, 8:19506 (R;US)
  - Tri-State Synfuels Project Review: Volume 11C. Cost reduction studies, 8:19510 (R;US)
  - Tri-State Synfuels Project Review: Volume 1C. Executive summary and overall project review, 8:19491 (R;US)
- **Triton, Washington, DC (USA)**
  - Establishment of leading energy indicators. Final report, 8:20771 (R;US)
- **TRW Energy Development Group, Redondo Beach, CA (USA)**
  - Central-cell blanket-module-maintenance approach for the MARS high-temperature blanket, 8:22746 (R;US)
  - Gravimelt process development. Quarterly technical progress report, 8:19620 (R;US)
- **TRW, Inc., Redondo Beach, CA (USA)**
  - Analytical modeling of spacecraft power systems. Final Report, July 1981-April 1982, 8:20040 (R;US)
  - Compendium of synfuel end use testing programs. Final report mar-sep 81, 8:19784 (R;US)
  - Test evaluation of gasoline transfer vapor recovery systems, 8:20979 (R;US)
- **T.S. Associates, Inc., Columbia, MD (USA)**
  - Laboratory assessment of the changes in thermal properties of polar diving suit material when exposed to oils at low temperatures. Final report Sep 80-Feb 81, 8:19723 (R;US)
- **Tufts Univ., Medford, MA (USA)**
  - High-energy physics at Tufts University. Final report, 8:22244 (R;US)
  - Low-cost, sprayed CdTe solar-cell research. Final report, 8:20024 (R;US)

U

- **Ube Industries Ltd., Ube (Japan)**
  - Mechanism and kinetics of NO/sub x/ gas absorption into alkaline solutions: considerations for selectivity toward hydroxylamine, 8:21229 (R;US)
- **UKAEA Atomic Energy Establishment, Winfrith. Technology Div.**
  - Degraded-core accidents: review of aerosol behaviour in the containment of a PWR, 8:20651 (R;GB)
- **UNC Nuclear Industries, Inc., Richland, WA (USA)**
  - Steam-Generator Dilute-Chemical-Cleaning Program: steam-generator chemical-cleaning project. Annual report for 1981, 8:20353 (R;US)
- **Union Carbide Corp., Oak Ridge, TN (USA). Computer Sciences Div.**
  - CATCH; map projection subroutine package, 8:22850 (R;US)
  - MAPPER; report-quality graphics on command, 8:22869 (R;US)
- **Union Carbide Corp., Oak Ridge, TN (USA). Nuclear Div.**
  - LASO; block lanczos symmetric eigenvalue code, 8:22864 (R;US)
- **United Engineers and Constructors, Inc., Philadelphia, PA (USA)**
  - High-temperature gas-cooled reactor steam-cycle/cogeneration, lead plant design and cost report. Volume III. Balance of plant, 8:20490 (R;US)
- **United Engineers and Constructors, Philadelphia, PA (USA). Technical Computer Services**
  - NPRFCCP; fuel cycle costs performance data, 8:20466 (R;US)
  - POWERCO; nuclear station electricity costs, 8:20471 (R;US)
  - WAMPUM; fuel cycle costs performance study, 8:20468 (R;US)
- **United Nations University, Tokyo (Japan)**
  - Goals, processes, and indicators of development: a project description, 8:20774 (R;JP)
- **United Technologies Corp., East Hartford, CT (USA). Research Center**
  - Optical diagnostics for diesel-engine applications, 8:21011 (R;US)
- **United Technologies Research Center, East Hartford, CT (USA)**
  - Energetics and radiative properties of excimer lasers. Final report, 8:21371 (R;US)
  - Parametric performance studies on fluizied-bed heat exchangers. Task 2. Experimental evaluation of multi-stage beds. Technical progress report, August 1, 1982-Decmber 31, 1982, 8:19636 (R;US)
- **Universities Space Research Association, Boulder, CO (USA)**
  - Terrestrial cooling and solar variability. Final report, 8:22133 (R;US)
- **University of Northern Iowa, Cedar Falls (USA). Dept. of Mathematics**
  - Lie algebras and flexible Lie-admissible algebras. Hadronic press monographs in mathematics Number 1, 8:22590 (R;US)
- **USDOE Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness, Washington, DC. Office of Operational Safety**
  - Summary of annual environmental reports for CY 1981: Department of Energy nuclear sites, 8:21831 (R;US)
- **USDOE Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness, Washington, DC. Office of the Deputy Assistant Secretary for Environment, Safety and Health**
  - Pollution-control costs: a status report, 8:19576 (R;US)
- **USDOE Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness, Washington, DC. Office of the Deputy Assistant Secretary for Strategic Petroleum Reserve**
  - Strategic Petroleum Reserve. Annual report, 8:19744 (R;US)
  - Strategic Petroleum Reserve. Quarterly report, 8:19745 (R;US)
- **USDOE Assistant Secretary for Fossil Energy, Washington, DC. Coal Gasification Div.**
  - Coal-gasification-process concepts, 8:19424 (R;US)
- **USDOE Assistant Secretary for Management and Administration, Washington, DC. Office of Facility Planning and Support**
  - FY 1981 annual report on In-House Energy Management, 8:20898 (R;US)
- **USDOE Assistant Secretary for Nuclear Energy, Washington, DC. Office of Terminal Waste Disposal and Remedial Action**
  - Uranium Mill Tailings Remedial Action Program. Annual status report, 8:19827 (R;US)
- **USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels**
  - Coal data: a reference, 8:19398 (R;US)
  - Coal distribution, January-December 1981, 8:19652 (R;US)
  - Coal distribution, January-June 1982, 8:19654 (R;US)
  - Coal distribution, January-March 1982, 8:19653 (R;US)
  - Coke plant report. Quarterly energy data report, July-September 1981, 8:19425 (R;US)
  - Coke plant report. Quarterly energy data report, October-December 1981, 8:19426 (R;US)
  - Cost and quality of fuels for electric utility plants, 8:20249 (R;US)
  - Cost and quality of fuels for electric utility plants, 8:20251 (R;US)

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Cost and quality of fuels for electric utility plants, 8:20253 (R;US)
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Electric power monthly, 8:20820 (R;US)
Guide for the assessment of technologies for generating electricity, 8:20822 (R;US)
Inventory of power plants in the United States. 1981 annual, 8:20254 (R;US)
Quarterly coal report, April-June 1982, 8:19651 (R;US)
Quarterly Coal Report, January-March 1982, 8:19650 (R;US)

USDOE Energy Information Administration, Washington, DC. Office of Energy Markets and End Use
International energy annual, 1981, 8:19672 (R;US)
Monthly energy review, 8:20859 (R;US)
Outlook for oil imports, 8:19714 (R;US)
Report on the 1980 manufacturing industries energy consumption study and survey of large combustors, 8:20861 (R;US)
Residential energy consumption survey: consumption and expenditures, April 1980-March 1981. Part 1. National data, 8:20860 (R;US)
Short term energy outlook. Volume I. Quarterly projections, 8:19710 (R;US)
Short-term energy outlook. Volume 1. Quarterly projections, 8:19711 (R;US)
Short-term energy outlook. Volume I. Quarterly projections, 8:19713 (R;US)
Short-term energy outlook. Volume II. Methodology, 8:20757 (R;US)
Short-term energy outlook, quarterly projections, 8:19712 (R;US)

USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas
Analysis of post-NGPA interstate pipeline wellhead purchases: an analysis of the Natural Gas Policy Act and several alternatives, Part III, 8:19758 (R;US)
Domestic natural gas reserves and production dedicated to interstate pipeline companies, 1981 (preliminary report), 8:20806 (R;US)
Monthly petroleum product price report, 8:19692 (R;US)
Monthly petroleum product price report, 8:19694 (R;US)
Monthly petroleum product price report, 8:19695 (R;US)
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Natural gas monthly, 8:19756 (R;US)
Outer Continental Shelf (OCS) Oil and Gas Supply Model. Model 1. Model summary and methodology description, 8:19674 (R;US)
Outer Continental Shelf (OCS) Oil and Gas Supply Model. Volume 2. Data description, 8:19675 (R;US)
Petroleum supply monthly, 8:19700 (R;US)
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Petroleum supply monthly, 8:19709 (R;US)
Statistics of interstate natural gas pipeline companies: 1981, 8:19757 (R;US)

USDOE Idaho Operations Office, Idaho Falls
AERIN; radioactive aerosol dose calculations, 8:21940 (R;US)

USDOE Morgantown Energy Technology Center, WV
Hydrocarbon content of the vapor phase and light-oil fraction in the output stream of the METC gasifier, 8:19472 (R;US)

USDOE, Washington, DC
Operation of PUREX and uranium oxide plant facilities, Hanford Site, Richland, Washington. Draft environmental impact statement, 8:21891 (R;US)
System for automated diagnosis of reactor-coolant pumps, 8:20352 (R;US)

Utah State Univ., Logan (USA). Utah Water Research Lab.
Energy siting in Utah: a programming model, 8:20292 (R;US)

Utah Univ., Salt Lake City (USA). Bureau of Economic and Business Research
Socioeconomic impacts: study of a conceptual nuclear energy center at Green River, Utah, 8:20627 (R;US)

Utah Univ., Salt Lake City (USA). Dept. of Mining and Fuels Engineering
Chemistry and catalysis of coal liquefaction: catalytic and thermal upgrading of coal liquid and hydrogenation of CO to produce fuels. Quarterly progress report, October-December 1982, 8:19430 (R;US)

V

Valtion Teknillinen Tutkimuskeskus, Espoo (Finland). Reaktorilab.
Evaluation of the Vuilleumier heat pump for heating applications. Vtt research report, 8:20916 (R;US)

Valtion Teknillinen Tutkimuskeskus, Espoo (Finland). Saehkoeteknilkan Lab.
Characteristics of an equidistant firing system in 12-pulse converter bridges for HVDC, 8:20311 (R;US)

Vanderbilt Univ., Nashville, TN (USA)
Advanced solar energy conversion, 8:20011 (R;US)

Varta Batterie A.G., Kelkheim (Germany, F.R.). Forschungs- und Entwicklungszentrum
Energy storage systems for terrestrial solar generators. Final report, Dec. 1980, 8:20032 (R;DE;In several languages)
Nickel-iron battery of high energy density. Final Report, Jul. 1980, 8:20743 (R;DE;In several languages)

Vereinigte Elektrizitaetswerke Westfalen A.G. (VEW), Dortmund (Germany, F.R.)
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Vineta, Inc., Falls Church, VA (USA)
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Power and energy measurement on Morgantown People Mover system. Final report Jul 80-Nov 81, 8:20957 (R;US)

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SMS-GOES solar soft x-ray measurements. Part II: SMS-2, GOES-1, GOES-2 and GOES-3 measurements from January 1, 1977 through December 31, 1980. Technical memo, 8:22160 (R;US)

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Verification tests of the U.S. Electricar Corporation Lectric Leopard. Technical report 3 Aug-25 Sep 81, 8:21025 (R;US)

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Investigation of the hydrochlorination of $SiCl_4$. Quarterly report, October 9, 1982-January 8, 1983. Flat-Plate Solar-Array Project, Advanced-Materials Research Task, 8:19995 (R;US)
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    Title, (supplementary information), citation number, (R:US)

The notations in the final parentheses indicate the type of document, e.g., R for Report; the country of publication, e.g., US; and the language if other than English, e.g., In German. Tables of document types and country of publication codes appear after the indexes.

The title may be supplemented with additional words, or a phrase, if it appears additional information would be helpful. In cases for which the title contains little or no information related to the subject entry, it may be replaced entirely by the supplementary information. A qualifier is not always required, and in such cases the title will follow the unqualified subject descriptor.

The descriptors selected for use as subject terms are generally the names of specific materials, things, or processes. To the extent possible, a qualifier is selected to describe the properties of, or processes applied to, the subject term.

Index entries are selected to indicate the important ideas and concepts presented in a document, rather than words that may appear in the text. Within the available thesaurus terms, the most probable or logical place to look for typical information is selected. "See references" are included to guide users from synonymous terms or phrases to the descriptor selected as a subject heading for the concept. (e.g. Pipeline Quality Gas see HIGH BTU GAS). "See also references" are used to indicate where to find references to subject concepts that are narrower, broader, or related to a particular subject heading. To complete an exhaustive search of a given subject, all such headings should be reviewed. Copies of DOE/TIC-7000, the Subject Thesaurus, are available from the National Technical Information Service (NTIS), U. S. Department of Commerce, Springfield, VA 22161.

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Spray combustion of synthetic fuels. Phase II. Spray-combustion phenomena. First quarterly report, 1 October 1981-1 January 1982, 8:19934 (R:US)
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Thermomechanical response of gr/pi composites. Final report, 1 October 1979-30 March 1981 (Graphite-polyimide), 8:21140 (R:US)

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Tri-State Synfuels Project Review: Volume 10. Narrative specification (Proposed Henderson, Kentucky coal to gasoline plant; equipment specifications;), 8:19507 (R:US)

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Density and composition imaging by photon energy spectrum sensing, 8:21921 (J:US)

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General approach to the testing of binary solubility systems for thermodynamic consistency. Consolidated Fuel Reprocessing Program, 8:21232 (R:US)

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ACSAP; resonance region cross section analysis (IBM360,370,303x; FORTRAN IV (92%) and BAL (8%)), 8:22512 (R:US)

ADEP; 1-dimensional and 2-dimensional few-group space-time kinetics (CDC6400; FORTRAN IV), 8:20539 (R:US)

AERIN; radioactive aerosol dose calculations (IBM360,303x; FORTRAN IV), 8:21940 (R:US)

AILMOE; cross section calculation of elastic scattering resonancess (IBM360; FORTRAN IV (H)), 8:22428 (R:US)

AIREK3; space-independent kinetics with feedback (IBM360; FORTRAN IV), 8:20492 (R:US)

AIROS2A; simulation of reactor dynamics (IBM360; FORTRAN IV (95%) and Assembly language (5%)), 8:20513 (R:US)

AISITE2; parametric site requirement study (IBM360; FORTRAN IV), 8:20622 (R:US)

ALEATO: code for processing numerical data by IBM-370, 8:22825 (R:IT:IT)

ALPHA-M; resolution of gamma-ray spectra (IBM360; FORTRAN IV), 8:22538 (R:US)

ANALYZE; hydrothermal reservoir test analysis (CDC7600; FORTRAN IV (99%) and COMPASS (1%)), 8:20170 (R:US)

ANCON; space-independent reactor kinetics code (CDC6600;IBM360,303x; FORTRAN IV), 8:20535 (R:US)

ANGCOR; directional correlation coefficients (CDC6600,7600; FORTRAN IV), 8:22514 (R:US)

ANSDDF; ANSI data description file utilities (IBM360,370,303x; PL/I), 8:22890 (R:US)

ANVENT; los of coolant analysis Duke Power McGuire units (GE635 MARK2 Time-Sharing System; FORTRAN IV), 8:20665 (R:US)

APACHE; two-dimensional chemically reactive fluid flow code (CDC7600; FORTRAN IV), 8:21415 (R:US)

APARNA2; one-dimensional integral neutron transport in slab geometries (IBM370,303x; FORTRAN IV), 8:22511 (R:US)

APRFX1; 99-group DLC-2B library group-collapsing (CDC6600; FORTRAN IV), 8:20530 (R:US)

ARC-NUI002 BCD Input Processor; BCD input data processing module (IBM360/50 and larger models; FORTRAN IV), 8:20549 (R:US)

ARC-SYSTEM; system subprograms and modules (IBM360/50 and larger models; FORTRAN IV, Assembler language, and macro definitions), 8:20544 (R:US)

ARRRG;FOOD; aquatic & terrestrial radiation (UNIVAC1100; FORTRAN), 8:21943 (R:US)

ASPIS; gamma-ray source buildup factor calculations (CDC6600; FORTRAN IV and ASCENT), 8:22490 (R:US)

Assessment of parameters in the simulation of an ANFLOW municipal-wastewater-treatment pilot plant (ANFLOW computer code), 8:21450 (R:US)

ATHENA4; inelastic scattering form factors (IBM360/75,91; FORTRAN IV), 8:22560 (R:US)

AVERAGE; unresolved region average cross section calculations (CDC6600; FORTRAN IV), 8:22474 (R:US)

AVOID; annular void cross section calculation (GE625; FORTRAN IV), 8:22445 (R:US)

ETOG3; ENDF/B to MUFT, GAM, ANISN cross-section format (CDC7600; FORTRAN IV), 8:20552 (R:US)

FAIMOS; one-dimensional, multigroup diffusion in slab, cylindrical, or spherical geometries (IBM360; FORTRAN IV (H)), 8:22427 (R:US)

FORM; fast neutron spectrum cross section calculations (IBM370; FORTRAN IV), 8:22425 (R:US)

GASPAN; complex gamma-ray spectra analysis (CDC6600; FORTRAN IV), 8:21566 (R:US)

KENO2;KENO4; Monte Carlo multigroup criticality code (IBM360;CDC6600; FORTRAN IV and Assembly language (IBM360), FTN FORTRAN with COMPASS subroutine (CDC6600)), 8:21329 (R:US)

PACTOLUS;CLOTHO; nuclear power plant cost code (UNIVAC1108; FORTRAN V), 8:20475 (R:US)

PERT; one-dimensional perturbation for AIM and FOG codes (IBM360; FORTRAN IV), 8:22422 (R:US)

RESEND;ADLER; ENDF/B resonance cross section codes (CDC6600;PDP10; FORTRAN IV), 8:20529 (R:US)
RICE; primary recoil atom spectra ENDF/B data (IBM360; FORTRAN IV), 8:22497 (R:US)
SIZZLE; one-dimensional multigroup diffusion depletion (IBM360; FORTRAN IV), 8:22426 (R:US)
STEAM-67; 1967 ASME steam and water properties (IBM360,370,303x; FORTRAN IV), 8:21227 (R:US)

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BE21; few-group, discrete ordinates for slab geometry (CDC6600; FORTRAN IV), 8:22482 (R:US)
BESFIT; diffraction model elastic scattering cross sections (CDC6600; FORTRAN IV), 8:22176 (R:US)
BETTIS ENVIRONMENTAL ROUTINES; MODEL6/3.3;MODEL7/2.0; modified Bettis Environmental Library scope 3.3 (CDC6600,7600; FORTRAN IV and ASCENT (Bettis), FORTRAN IV and COMPASS (MODEL 6/3.3, MODEL 7/2.0)), 8:22835 (R:US)
BISYN; two-dimensional, multigroup diffusion synthesis calculations (GE635;UNIVAC1108; FORTRAN IV), 8:22447 (R:US)
BL47; drafting tool to plot plane structures (CDC6600; FORTRAN IV), 8:21318 (R:US)
BLAST; reactor kinetics temperature distribution study (IBM360; FORTRAN IV), 8:20516 (R:US)
BLOOST6; combined kinetics two-dimensional heat transfer (UNIVAC1108; FORTRAN IV and Assembly language), 8:20505 (R:US)
BNWIGL;UNIWIGL; two-group time-dependent one-dimensional diffusion (UNIVAC1108,1100;CDC6600; FORTRAN (99%) and COMPASS (1%) (CDC6600), FORTRAN V (UNIVAC1108)), 8:22510 (R:US)
BRT1; thermal spectrum cross section calculations (UNIVAC1108; FORTRAN V), 8:20497 (R:US)
BUBL1; fuel swelling & gas release simulation (CDC6600; FORTRAN IV), 8:20608 (R:US)
BUG2; two-dimensional multigroup diffusion & burnup in xy, rz geometries (UNIVAC1108; FORTRAN IV and Assembly language), 8:22495 (R:US)
BUGTRI; two-dimensional multigroup diffusion & burnup in triangular geometries (UNIVAC1108; FORTRAN IV and Assembly language), 8:22496 (R:US)
BURNUP; heavy element isotopic burnup analysis (GE635; FORTRAN IV), 8:20509 (R:US)
BURST1; hydrodynamic analysis during blowdown (IBM360/75; FORTRAN IV), 8:21412 (R:US)
BUSHL; cylindrical shell buckling collapse analysis (CDC6600; FORTRAN IV), 8:20609 (R:US)
CAGE;BIRD;SPEC; time-of-flight data analysis (UNIVAC1108; FORTRAN V), 8:22501 (R:US)
Documentation for the QMC generic LP modelling system. Final report, 8:22874 (R:XE)
EPOCH; neutron age calculation of ENDF/B data (CDC6600; FORTRAN IV), 8:20321 (R:US)
FUMBLE; fast reactor fuel burnup & management (GE635; FORTRAN IV), 8:20410 (R:US)
HRG3; slowing-down spectrum, multigroup constants (UNIVAC1108;IBM360,370; FORTRAN IV), 8:20531 (R:US)
SUBDOSA; external dose airborne radionuclides (UNIVAC1100; FORTRAN), 8:21942 (R:US)
User's manual for the bill comparison and usage modification programs. Rate-design analysis study module IV. Technical appendix to final report, 8:20850 (R:US)

C Codes
2DB; two-dimensional multigroup diffusion and depletion (UNIVAC1108;CDC6600; FORTRAN IV), 8:22457 (R:US)
BUBL1; fuel swelling & gas release simulation (CDC6600; FORTRAN IV), 8:20608 (R:US)
CAESAR4; liblst; one-dimensional, multigroup diffusion (IBM360; FORTRAN IV), 8:22441 (R:US)
CAGE;BIRD;SPEC; time-of-flight data analysis (UNIVAC1108; FORTRAN V), 8:22501 (R:US)
CATCH; map projection subroutine package (IBM360,370,303x; FORTRAN IV), 8:22850 (R:US)
CCC; one-phase conduction convection compaction (CDC7600; FORTRAN IV), 8:20171 (R:US)
CEXE;INCEXE; one-group, three-dimensional xyz xenon oscillation (IBM360; FORTRAN IV), 8:20520 (R:US)
CHAINS; analysis of radioactive decay chains (GE625,635; FORTRAN IV), 8:22539 (R:US)
CHECKER;CRECT;DAMMET;PLOTFB; SLAVE3 ENDF/B V1 processing codes; CHECKER,CRECT,DAMMET,PLOTFB,... ENDF/B V1 proc (CDC6600; FORTRAN IV), 8:22477 (R:US)
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CHIC-KIN; fast and intermediate power transients (CDC6600; FORTRAN IV), 8:20632 (R:US)
CINCAS; nuclear fuel cycle cost and economics (IBM360;CDC6600; FORTRAN IV), 8:20472 (R:US)
CINDER;M0102; point depletion fission product (CDC6600;IBM360; FORTRAN IV (CDC6600), FORTRAN IV and BAL (IBM360)), 8:20510 (R:US)
CITATION; one-, two-, and three-dimensional diffusion depletion using multigroup theory (IBM360,303x; FORTRAN IV), 8:22479 (R:US)
CLEM; angular distribution Legendre fitting (CDC6600; FORTRAN IV), 8:20547 (R:US)
CLIP; form or thredes library utility routine (IBM360; FORTRAN IV), 8:22442 (R:US)
CLOUD; gamma-ray dose rate from a cloud (IBM360; FORTRAN IV), 8:21795 (R:US)
CLUP77; square cell collision probability calculations (FACOM230-60;IBM360; FORTRAN IV), 8:20546 (R:US)
COAST4; costing & sizing of tokamak reactors (CDC7600; FORTRAN (FTN compiler)), 8:22686 (R:US)
COBRA4I; rod bundle & core thermal-hydraulics (CDC6600,7600,CYBER175;CRAY1; FORTRAN IV), 8:20605 (R:US)
CODILLI; least squares analysis of resonance data (IBM360; FORTRAN IV), 8:22463 (R:US)
COHBE;PREP; coherent inelastic scattering law calculations (UNIVAC1108; FORTRAN IV), 8:22478 (R:US)
COLCO; thermal diffusion column coefficients (IBM360,303x;CDC6600,CYBER175; FORTRAN IV), 8:19903 (R:US)
COMNUC;CASCADE; compound nucleus reaction (IBM360; FORTRAN IV with one Assembler language subroutine for performing internal I/O.), 8:22366 (R:US)
Comparable Sale Data Base users manual. Version 1.1, 8:21933 (R:US)
CONCEPT5;CONCEPT3; power plant conceptual cost estimate (IBM360,370;UNIVAC1108; FORTRAN IV (H) (98%) and Assembly language (2%) (IBM360); FORTRAN IV (UNIVAC1108)), 8:20474 (R:US)
CONTEMPT-LT/028;CONTEMPT-LT/026; pressure-temperature response (CDC7600,CYBER176;IBM360; FORTRAN IV and COMPASS (CDC7600), FORTRAN IV and BAL (IBM360)), 8:20569 (R:US)
CORGAM; unfolding of complex gamma-ray spectra (IBM360/50; FORTRAN IV Level G), 8:22559 (R:US)
CPDREV; spare parts inventory control system (UNIVAC1100;CDC6600,CYBER74,175; FORTRAN (99%) and Assembly language (1%)), 8:22824 (R:US)
CRECT;CHECKER;RIGEL;PLOTFB; LISTFC;DICTION;SLAVE3;DAMMET ENDF/B V2 processing codes (CDC6600;IBM360; FORTRAN IV), 8:22349 (R:US)
CURFIT; curve fitting experimental data points (CDC6600; FORTRAN IV and ASCENT), 8:20491 (R:US)
CURIE; fission product inventory decay history (IBM370; FORTRAN IV), 8:20498 (R:US)
CYGRO2; stress analysis of cylindrical fuel element (CDC6600; FORTRAN IV), 8:20599 (R:US)
CYGRO3; oxide fuel rod stress & deformation (CDC6600;IBM360,370; FORTRAN IV (CDC6600), FORTRAN IV and Assembly language (IBM360)), 8:20606 (R:US)

DTF4; one-dimensional, multigroup discrete ordinate program (IBM360;CDC6600;GE625; FORTRAN IV (CDC6600), FORTRAN IV and MAP (GE625), FORTRAN IV and BAL (IBM360)), 8:22432 (R:US)
ETOG1 Data for MUFT and GAM Libraries; MUFT4 or 5, GAM1 or 2 (CDC6600), 8:22341 (R:US)
LEOPARD;SPOTS; sjectrum calculation with depletion (IBM360;UNIVAC1108; FORTRAN IV(H) (IBM360) and FORTRAN V (UNIVAC1108)), 8:20503 (R:US)
MIRAB;MIRAP; containment system iodine removal (CDC6400; FORTRAN IV), 8:20656 (R:US)

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PUN1; unresolved resonance integral cross sections (CDC6600; FORTRAN IV), 8:22467 (R:US)

D Codes

1DX; one-dimensional diffusion fast cross section generation (UNIVAC1108;IBM360,370; FORTRAN IV (UNIVAC1108), FORTRAN IV and BAL (IBM360,370)), 8:22472 (R:US)
2DF; two-dimensional, multigroup discrete ordinate code (UNIVAC1108; FORTRAN V), 8:22430 (R:US)
3DDT; 3-dimensional multigroup diffusion xyz or r-theta-z (CDC6600; FORTRAN IV), 8:20528 (R:US)
3DXT;DEP3; 3-dimensional xenon transient and depletion (CDC6600; FORTRAN IV), 8:20534 (R:US)
APRFX1; 99-group DLC-2B library group-collapsing (CDC6600; FORTRAN IV), 8:20530 (R:US)
CRECT;CHECKER;RIGEL;PLOTFB; LISTFC;DICTION;SLAVE3;DAMMET ENDF/B V2 processing codes (CDC6600;IBM360; FORTRAN IV), 8:22349 (R:US)
DAC1; SN perturbation code using DTF4 fluxes (CDC6600; FORTRAN IV), 8:20525 (R:US)
DACRIN; radiation organ dose from inhalation (UNIVAC1100; FORTRAN), 8:21941 (R:US)
DAFT1; least squares fit for fissile nuclide data (CDC6600; FORTRAN IV), 8:22386 (R:US)
DATATRAN2; modular programming and data system (CDC6600,7600,CYBER176; FORTRAN (85), COMPASS (15)), 8:22828 (R:US)
DATATRAN2 RAD1 Geometry Modules; radial geometry modules for two-dimensional imput (CDC6600,7600; FORTRAN (90), COMPASS (5), DATATRAN2 (5)), 8:21325 (R:US)
DATATRAN2 Utility Plotting Modules; utility plot modules f(x) & f(x,y) (CDC6600,7600; FORTRAN (80), COMPASS (15), DATATRAN2 (5)), 8:21326 (R:US)
DBUFIT1; least squares transmutation analysis (UNIVAC1108; FORTRAN V), 8:20526 (R:US)
DESA; district energy system cost energy model (IBM370,303x; FORTRAN IV), 8:20994 (R:US)
DEVOG; coupled molecular scattering equations (CDC7600,CYBER175; FORTRAN IV), 8:22334 (R:US)
DOBIS multiple data base support as implemented at Sandia National Laboratories Technical Library, 8:22877 (R:US)
DOGGY; desk calculator form sheet DP package (CDC6600; FORTRAN IV and ASCENT), 8:22830 (R:US)
DOS; neutron flux-dosimeter activity relation (GE625,635; FORTRAN IV), 8:20522 (R:US)
DOT2DB; 2-dimensional multigroup diffusion & SN theory (GE635; FORTRAN IV), 8:22498 (R:US)
DSTRESS; transient fuel model for clad strain (CDC6600,CYBER175; FORTRAN IV), 8:20672 (R:US)
DUZ2; 2-dimensional axisymmetric and plane elastic-plastic (CDC6600), 8:20570 (R:US)
DYNAM; dynamic analysis boiling flow steam (UNIVAC1108; FORTRAN), 8:21413 (R:US)
DYNO1; photomultiplier electron distribution (CDC6600;IBM360; FORTRAN IV), 8:21624 (R:US)
KENO2;KENO4; Monte Carlo multigroup criticality code (IBM360;CDC6600; FORTRAN IV and Assembly language (IBM360), FTN FORTRAN with COMPASS subroutine (CDC6600)), 8:21329 (R:US)
NRTS OS/360 Remote Job Entry; OS/360 MVT remote job entry system (IBM360/75; Assembler), 8:22841 (R:US)
PHENIX; 2-dimensional diffusion burnup refueling history (CDC6600; FORTRAN IV), 8:20408 (R:US)
User's manual for geophysical well-logging software programs, 8:22054 (R:US)

Documentation

Computer program abstract as software documentation, 8:22872 (R:US)

E Codes

CRECT;CHECKER;RIGEL;PLOTFB; LISTFC;DICTION;SLAVE3;DAMMET ENDF/B V2 processing codes (CDC6600;IBM360; FORTRAN IV), 8:22349 (R:US)
ECCSA4; loss-of-coolant & emergency cooling (CDC6400; FORTRAN IV), 8:20566 (R:US)
EDITOR; ENDF/B tape processing and editing (IBM360;CDC6600; FORTRAN IV), 8:20540 (R:US)
ELEFUNT; tests of Fortran elementary functions (IBM360,370,303x;CDC6600,7600; UNIVAC1108,1100; FORTRAN), 8:22852 (R:US)
ENDRUN2; multigroup constants from ENDF/B data (GE635; FORTRAN IV), 8:20412 (R:US)
EPOCH; neutron age calculation of ENDF/B data (CDC6600; FORTRAN IV), 8:20321 (R:US)
EQ3/6; chemical equilibrium of aqueous systems (CDC7600;CRAY1; FORTRAN Extended 4.6 (CDC7600) and CFT (CRAY1)), 8:21154 (R:US)
EQUIPOISE3; two-dimensional, two group diffusion is slabs or cylinders (CDC CYBER73,175;CDC7600; FORTRAN IV), 8:22423 (R:US)
ERREST; loss of coolant rod bundle critical heat flux data analysis (IBM360; FORTRAN IV), 8:20660 (R:US)
ESP; Monte Carlo reactor analysis calculation (IBM360/75,91; FORTRAN IV and BAL), 8:20545 (R:US)
ETOG1; ENDF/B to MUFT, GAM, ANISN corss sections format (CDC6600; FORTRAN IV), 8:22494 (R:US)
ETOG1 Data for MUFT and GAM Libraries; MUFT4 or 5, GAM1 or 2 (CDC6600), 8:22341 (R:US)
ETOG3; ENDF/B to MUFT, GAM, ANISN cross-section format (CDC7600; FORTRAN IV), 8:20552 (R:US)
ETOM1; ENDF/B format to MUFT format cross sections (CDC6600; FORTRAN IV), 8:22493 (R:US)
ETOT2; thermal libraries from ENDF/B data (CDC7600; FORTRAN IV), 8:20542 (R:US)
ETOX3; multigroup constants from ENDF/B for one dimension (UNIVAC1108;IBM360,370; FORTRAN IV), 8:22480 (R:US)
EVENT user's manual: a computer code for analyzing explosion-induced gas-dynamic transients in flow networks, 8:21439 (R:US)
EXPALS; least squares exponential decay curves (CDC7600,6600; FORTRAN IV), 8:21289 (R:US)
EXPN; analysis of pulsed neutron source data (GE635; FORTRAN IV), 8:19904 (R:US)
EXTERMINATOR2; two-dimensional, multigroup diffusion program diffusion program (IBM360;GE625;CDC6600; FORTRAN IV), 8:22429 (R:US)
PHROG; multi-group constant and fast spectra calculations (IBM360; FORTRAN IV), 8:20543 (R:US)
TDOWN; spatial & composition-dependent cross sections (GE635; FORTRAN IV), 8:20541 (R:US)
ZPR-III Assembly 48 GAFGAR ENDF/B Data Tapes; ZPR-III assembly 48 GAFGAR ENDF/B data tapes (UNIVAC1108; Variable-length binary records), 8:20515 (R:US)

F Codes

AIM6; one-dimensional multi-group diffusion slabs, cylinders, and spherese (IBM370; FORTRAN IV), 8:22421 (R:US)
ARRRG;FOOD; aquatic & terrestrial radiation (UNIVAC1100; FORTRAN), 8:21943 (R:US)
ENDF/B-THERMOS; 30-group ENDF/B scattering kernels (Auxiliary program written in FORTRAN IV), 8:22506 (R:US)
FAIMOS; one-dimensional, multigroup diffusion in slab, cylindrical, or spherical geometries (IBM360; FORTRAN IV (H)), 8:22427 (R:US)
FARED; one-dimensional fast reactor design & survey study (CDC6600; FORTRAN IV and COMPASS), 8:20524 (R:US)

FC;LSEI;WNNLS; constrained least squares fit (CDC6600,7600,CYBER175 (designed to be machine-independent); FORTRAN IV), 8:22859 (R:US)
FCC4; fundamental mode fast reactor cross section calculations (UNIVAC1108; FORTRAN IV), 8:20243 (R:US)
FESH; x-y multi-group neutron transport method (CDC6600,7600; FORTRAN IV (MNF, University of Minnesota FORTRAN)), 8:22508 (R:US)
FEVER; one-dimensional, few-group diffusion depletion program (CDC CYBER73,175;CDC7600; FORTRAN IV), 8:20390 (R:US)
FEVER7; one-dimensional multigroup diffusion and depletion (UNIVAC1108; FORTRAN IV), 8:22454 (R:US)
FIGRO; LWBR fuel swelling temperature study (CDC6600; FORTRAN IV), 8:20600 (R:US)
FIGS; IBM360 and 2250 FORTRAN graphics subroutines (IBM360; FORTRAN IV and BAL), 8:22836 (R:US)
FINEL; finite-element study in two,-and three-dimensonal structures (CDC6600; FORTRAN IV), 8:21324 (R:US)
FLAC; steady-state flow, pressure distribution (UNIVAC1108;IBM370;CDC6600; FORTRAN V (UNIVAC1108) and FORTRAN IV (IBM370 and CDC6600)), 8:20568 (R:US)
FLANGE1; scattering law cross section calculation (UNIVAC1108; FORTRAN V), 8:22437 (R:US)
FLANGE2/71-1; ENDF/B thermal scattering data (IBM360; FORTRAN IV), 8:22469 (R:US)
FLARE; three-dimensional reactivity and power distribution (GE635;IBM360;CDC7600; FORTRAN IV), 8:20494 (R:US)
FLASH3; loss-of-coolant accident analysis (CDC6600; FORTRAN IV), 8:20564 (R:US)
FLASH6;FLASH4; fully-implicit transient simulation (IBM360,370;CDC6600,7600; FORTRAN IV), 8:20654 (R:US)
FLOCHT; computer drawn flow charts & diagrams (DEC PDP10 with IBM360,370 or 303x; FORTRAN IV (99%), Assembly language (1%)), 8:22870 (R:US)
FLOW-MODEL; multi-channel two-dimensional, two-phase flow (IBM360;CDC CYBER73;CDC6600,7600; FORTRAN IV), 8:20318 (R:US)
FOG; one-dimensional few-group few-gp diffusion slab cylinder sphere (GE625; FORTRAN IV), 8:22420 (R:US)
FORE2; fast reactor excursion calculations (GE635;IBM360; FORTRAN IV), 8:20496 (R:US)
FORSIM; solution of partial or ordinary differential equations (CDC6600; FORTRAN Extended), 8:22838 (R:US)
FRANTIC; least squares fit sum of exponentials (IBM370; FORTRAN IV), 8:21291 (R:US)
FRCRL2; LOCA fission product release analysis (CDC6400; FORTRAN IV), 8:20657 (R:US)
FREADM1; fast reactor core accident analysis (GE635; FORTRAN IV), 8:20655 (R:US)
FREVAP6; HTGR metallic fission product release (UNIVAC1108; FORTRAN IV), 8:20602 (R:US)
FSDP3; pointwise cross sections from Breit-Wigner parameters (UNIVAC1108; FORTRAN V), 8:22434 (R:US)
FUMBLE; fast reactor fuel burnup & management (GE635; FORTRAN IV), 8:20410 (R:US)
FX2-TH; two-dimensional time-dependent reactor kinetics (IBM370,303X; FORTRAN IV (99%) and Assembly language (1%)), 8:22509 (R:US)
PERT; one-dimensional perturbation for AIM and FOG codes (IBM360; FORTRAN IV), 8:22422 (R:US)
SYN; 2-dimensional synthesis multigroup diffusion and 1-group depletion (GE635; FORTRAN IV and GMAP), 8:20411 (R:US)

G Codes

BUSHL; cylindrical shell buckling collapse analysis (CDC6600; FORTRAN IV), 8:20609 (R:US)
ETOG1 Data for MUFT and GAM Libraries; MUFT4 or 5, GAM1 or 2 (CDC6600), 8:22341 (R:US)
ETOG3; ENDF/B to MUFT, GAM, ANISN cross-section format (CDC7600; FORTRAN IV), 8:20552 (R:US)
GADOSE;DOSET; HTGR accident analysis dose calculations (UNIVAC1108; FORTRAN IV), 8:20391 (R:US)
GAFFE; equilibrium fuel cycle calculation (UNIVAC1108; FORTRAN IV), 8:20470 (R:US)
GAFGAR;p3t;PROC;TAPCOP; spectra and group-averaged cross section calculation (UNIVAC1108; FORTRAN IV), 8:20511 (R:US)
GAKER; inelastic scattering cross section calculations for moderators (UNIVAC1108; FORTRAN IV), 8:22448 (R:US)
GAKIT; one-dimensional, multigroup kinetics with temperature feedback (UNIVAC1108; FORTRAN IV), 8:22470 (R:US)
GAMBLE5; two-dimensional, multigroup diffusion in xy and rz geometry (UNIVAC1108; FORTRAN IV and Assembly language), 8:22435 (R:US)
GAMTEC2; multigroup constant calculations for 0 to 10 MeV (UNIVAC1107;GE625;CDC6400; FORTRAN IV), 8:22431 (R:US)
GAMTRI; two-dimensional, multigroup, diffusion triangular mesh geometries (UNIVAC1108; FORTRAN IV (90%) and Assembly language (10%)), 8:22484 (R:US)
GAND; GAFGAR cross-section library preparation (UNIVAC1108; FORTRAN IV), 8:20514 (R:US)
GANDY3; unresolved resonance cross secton calculation (UNIVAC1108; FORTRAN IV), 8:22460 (R:US)
GAPER2D; 2-dimensional perturbation calculation from 2DF output (UNIVAC1108; FORTRAN V), 8:20532 (R:US)
GAPL3; inelastic large deflection stress study (CDC6600; FORTRAN IV and Assembly language), 8:21322 (R:US)
GAPOTKIN; space-independent reactor kinetics (UNIVAC1108; FORTRAN IV), 8:20512 (R:US)
GARLIC-B. A digital code for real-time calculation of the transient behaviour of nodal and global core and plant parameters of BWR nuclear power plants, 8:20329 (R:DE)
GASA (GA Stability Analysis); stability analysis for reactor kinetic equations (UNIVAC1108; FORTRAN IV), 8:20504 (R:US)
GASKET; thermal scattering law calculation (UNIVAC1108; FORTRAN IV), 8:22440 (R:US)
GASP7; one-dimensional burnup power distribution search (UNIVAC1108; FORTRAN IV), 8:22455 (R:US)
GASPAN; complex gamma-ray spectra analysis (CDC6600; FORTRAN IV), 8:21566 (R:US)
GATT; three-dimensional, few-group diffusion calculations in hexagonal geometries (UNIVAC1108; FORTRAN IV), 8:22476 (R:US)
GAUGE; two-dimensional, few-group, neutron diffusion in hexagonal geometries (UNIVAC1108; FORTRAN IV), 8:22459 (R:US)
GAZE2; one-dimensional multigroup diffusion in slab, spherical, and cylindrical geometries (UNIVAC1108; FORTRAN IV (95%) and Assembly language (5%)), 8:22491 (R:US)
GEM; eigenvalue problem for vibrating systems (CDC6600; FORTRAN IV and ASCENT), 8:21316 (R:US)
GENED ENVIRONMENTAL ROUTINES; subroutine library (GE635; FORTRAN IV and GMAP), 8:22839 (R:US)
GENRD; free-format card input processor (CDC6600;IBM360; ANSI Standard FORTRAN), 8:22842 (R:US)
GETOUT; radionuclide transport geologic media (UNIVAC1100; FORTRAN), 8:21870 (R:US)
GGC4; multigroup cross sections fast thermal spectra (UNIVAC1108;CDC6600; FORTRAN V (UNIVAC1108), FORTRAN IV (CDC6600)), 8:22451 (R:US)
GLEN; group constant calculations from TOR output data (CDC6600; FORTRAN IV), 8:22468 (R:US)
GLUB1; water-logged fuel element analysis (CDC6600; FORTRAN IV), 8:20604 (R:US)
GRAIL; a device-independent graphics language (CDC6600,7600; FORTRAN IV (81%) and COMPASS (19%)), 8:22860 (R:US)
GRAMP; r-m parameters of unresolved resonances (CDC6600; FORTRAN IV), 8:22387 (R:US)
GRDWRK; grid generation for safe programs (UNIVAC1108; FORTRAN IV), 8:21312 (R:US)
GROUSE; space-dependent cross section generation (GE625,635; FORTRAN IV), 8:20521 (R:US)

GSMP; general systems analysis modeling code (IBM370,303x; PL/I (90%), FORTRAN IV (9%), and Assembly language (1%)), 8:22853 (R:US)

GSSLRN1B; least squares photopeak spectra code (UNIVAC1108; FORTRAN V with Assembler language used for two minor routines), 8:20527 (R:US)

GWCORE; GSPC 79 core graphics routines package (DEC VAX11/780; The device-independent part of GWCORE is written solely in VAX11/780 FORTRAN IV-Plus. There is very limited use of FORTRAN 77 IF-THEN-ELSE control structures and CHARACTER data types. The Tektronix 4012 driver is written in FORTRAN. The Ramtek 9400 driver is written in C.), 8:22858 (R:US)

KAPLPLOT; KAPL CalComp plotting routines (CDC6600; FORTRAN IV and ASCENT), 8:22837 (R:US)

KENO2;KENO4; Monte Carlo multigroup criticality code (IBM360;CDC6600; FORTRAN IV and Assembly language (IBM360), FTN FORTRAN with COMPASS subroutine (CDC6600)), 8:21329 (R:US)

RICE; primary recoil atom spectra ENDF/B data (IBM360; FORTRAN IV), 8:22497 (R:US)

User's guide for 10 CFR 61 impact analysis codes (INTRUDE; GRWATER;OPTIONS;INVERSI;INVERSW), 8:19882 (R:US)

ZPR-III Assembly 48 GAFGAR ENDF/B Data Tapes; ZPR-III assembly 48 GAFGAR ENDF/B data tapes (UNIVAC1108; Variable-length binary records), 8:20515 (R:US)

H Codes

DUZ2; 2-dimensional axisymmetric and plane elastic-plastic (CDC6600), 8:20570 (R:US)

HAA3B; aerosol behavior lognormal model (IBM370; FORTRAN IV (H)), 8:20653 (R:US)

HAMMER;LITHE;HELP; critical analysis system (IBM360; FORTRAN IV and BAL), 8:20502 (R:US)

HEATING2; transient steady-state heat transfer (IBM370,3033; FORTRAN IV), 8:21407 (R:US)

HEATING5;HEATING3; 1,2, or 3-dimensional heat conduction program (IBM360,303x;CDC CYBER73;CDC7600; FORTRAN IV (95%) and Assembly language (5%) (HEATING5), FORTRAN IV (HEATING3)), 8:21414 (R:US)

HEATMESH; geometrical data heat transfer study (CDC6600; FORTRAN IV), 8:21328 (R:US)

HERESY3; two-dimensional heterogeneous reactor calculation (IBM360; FORTRAN IV and BAL), 8:20493 (R:US)

HERMES; regional radiological effects analysis (UNIVAC1108; FORTRAN IV and SLEUTH), 8:20663 (R:US)

HEXSCAT; elastic scattering cross sections hexagonal lattice (UNIVAC1108; FORTRAN IV), 8:22449 (R:US)

HFN; one-dimensional, multigroup diffusion in slabs, cylinders, and spheres (UNIVAC1107;CDC6600,CYBER74; FORTRAN IV (99.9%) and SLEUTH-II (0.1%) (UNIVAC1107), FORTRAN IV (CDC6600)), 8:22436 (R:US)

HOT2; two-dimensional transient heat conduction program (CDC6600; FORTRAN IV), 8:21408 (R:US)

HWOCR-SAFE; two-dimensional Monte Carlo cell calculation (IBM360; FORTRAN IV (H) and BAL), 8:20507 (R:US)

KENO2;KENO4; Monte Carlo multigroup criticality code (IBM360;CDC6600; FORTRAN IV and Assembly language (IBM360), FTN FORTRAN with COMPASS subroutine (CDC6600)), 8:21329 (R:US)

WSP-HASP/DOS; DOS-MFT remote workstation package (IBM360; DOS Assembler language), 8:22843 (R:US)

I Codes

CRECT;CHECKER;RIGEL;PLOTFB; LISTFC;DICTION;SLAVE3;DAMMET ENDF/B V2 processing codes (CDC6600;IBM360; FORTRAN IV), 8:22349 (R:US)

ICARUS; redundant system unavailability model (IBM370,303x; FORTRAN IV), 8:20668 (R:US)

IDAP; interactive decision analysis procedure (IBM360,370,303x; PL/I), 8:22867 (R:US)

INTEROP; nonlinear optimization algorithms (CDC CYBER173;CDC6600,7600; FORTRAN IV (90%) and COMPASS (10%)), 8:22848 (R:US)

ISOGEN; radionuclide generation and decay (UNIVAC1108; FORTRAN V), 8:19905 (R:US)

ISOSEARCH; isotope production flux, cross section calculations (IBM360; FORTRAN IV and BAL), 8:21290 (R:US)

ISOTOPES; maximum yield from reaction or decay (UNIVAC1100; FORTRAN V), 8:19902 (R:US)

KAPLPLOT; KAPL CalComp plotting routines (CDC6600; FORTRAN IV and ASCENT), 8:22837 (R:US)

User's guide for 10 CFR 61 impact analysis codes (INTRUDE; GRWATER;OPTIONS;INVERSI;INVERSW), 8:19882 (R:US)

J Codes

JITER; fluctuation experiment analysis (CDC6600; FORTRAN IV), 8:20518 (R:US)

JOSHUA OPERATING SYSTEM; data storage, retrieval, and display (IBM360,370,303x; FORTRAN IV (60%) and Assembler language (40%)), 8:20537 (R:US)

JP1XR; coupled-channel scattering cross section calculations (CDC6600; FORTRAN IV), 8:22504 (R:US)

JUPITOR1;JP1; coupled channel x-sec evaluation (IBM360; FORTRAN IV), 8:22452 (R:US)

RAHAB Lattice Physics Modules; JOSHUA system lattice physics modules (IBM360; FORTRAN IV), 8:20551 (R:US)

K Codes

3DXT;DEP3; 3-dimensional xenon transient and depletion (CDC6600; FORTRAN IV), 8:20534 (R:US)

CLEM; angular distribution Legendre fitting (CDC6600; FORTRAN IV), 8:20547 (R:US)

ETOT2; thermal libraries from ENDF/B data (CDC7600; FORTRAN IV), 8:20542 (R:US)

K-FIX;3D; three-dimensional extension two-phase flow dynamics (CDC7600; FORTRAN IV), 8:20553 (R:US)

K-TIF; two-fluid PWR downcomer fluid dynamics (CDC7600; FORTRAN (LRLTRAN and CHAT compiler)), 8:20351 (R:US)

KAPLPLOT; KAPL CalComp plotting routines (CDC6600; FORTRAN IV and ASCENT), 8:22837 (R:US)

KAPPAS; semiclassical transmission probability (CDC7600,CYBER74,175; FORTRAN IV), 8:22340 (R:US)

KENO2;KENO4; Monte Carlo multigroup criticality code (IBM360;CDC6600; FORTRAN IV and Assembly language (IBM360), FTN FORTRAN with COMPASS subroutine (CDC6600)), 8:21329 (R:US)

MULTI; multi-level resonance theory cross section calculations (CDC6600; FORTRAN IV), 8:20550 (R:US)

PREP;KITT; system fault tree evaluation codes (IBM360;UNIVAC1108; FORTRAN IV), 8:20664 (R:US)

TEMPEST2; thermal neutron spectrum cross sections (IBM360; FORTRAN IV), 8:22424 (R:US)

L Codes

DBUFIT1; least squares transmutation analysis (UNIVAC1108; FORTRAN V), 8:20526 (R:US)

ETOT2; thermal libraries from ENDF/B data (CDC7600; FORTRAN IV), 8:20542 (R:US)

GSSLRN1B; least squares photopeak spectra code (UNIVAC1108; FORTRAN V with Assembler language used for two minor routines), 8:20527 (R:US)

LARCA; flux-weighting of DTF4 cross sections (CDC6600; FORTRAN IV), 8:22486 (R:US)

LASER; spectrum calculations with burnup cylindrical lattice (IBM360,370; FORTRAN IV), 8:20499 (R:US)

LASO; block lanczos symmetric eigenvalue code (IBM360,370,303x (designed to be machine-independent); FORTRAN IV), 8:22864 (R:US)

LCURVE; learning curve production calculations (Honeywell Series 60 Level 66 Model 20; BASIC), 8:22868 (R:US)

LIFE3; mixed-oxide fuel element performance (IBM370;CDC7600; FORTRAN IV), 8:20607 (R:US)

LINSED; one-dimensional multireach sediment transport model (IBM360,303x; FORTRAN IV), 8:22027 (R:US)

LION4;LION; three-dimensional temperature distribution program (CDC6600,7600;UNIVAC1108;IBM360,370;

FORTRAN IV and ASCENT (CDC6600,7600), FORTRAN IV (UNIVAC1108A,B and IBM360,370)), 8:20565 (R:US)
LIZARD4; nonlinear differential equations solution (CDC6600; FORTRAN IV and ASCENT), 8:22833 (R:US)
LOGD; multichannel log-derivative scattering (CDC7600,CYBER175; FORTRAN IV), 8:22338 (R:US)
LPMGB; linear programming subroutine with bounds (CDC7600,CYBER175;IBM370,303x; FORTRAN), 8:22862 (R:US)
User's manual for geophysical well-logging software programs, 8:22054 (R:US)
Wind systems life cycle cost analysis: a description and users manual (LIFECC), 8:20209 (R:US)

M Codes
BETTIS ENVIRONMENTAL ROUTINES; MODEL6/3.3;MODEL7/2.0; modified Bettis Environmental Library scope 3.3 (CDC6600,7600; FORTRAN IV and ASCENT (Bettis), FORTRAN IV and COMPASS (MODEL 6/3.3, MODEL 7/2.0)), 8:22835 (R:US)
ETOG1 Data for MUFT and GAM Libraries; MUFT4 or 5, GAM1 or 2 (CDC6600), 8:22341 (R:US)
ETOG3; ENDF/B to MUFT, GAM, ANISN cross-section format (CDC7600; FORTRAN IV), 8:20552 (R:US)
FORM; fast neutron spectrum cross section calculations (IBM370; FORTRAN IV), 8:22425 (R:US)
M0219;FLOT1; PWR flow transient analysis (CDC6600; FORTRAN IV), 8:20350 (R:US)
M0266; linear elastic structural dynamics (CDC6600; FORTRAN IV), 8:21321 (R:US)
M0457;PIPE; elastic stress of piping system (CDC6600; FORTRAN IV), 8:21313 (R:US)
M0552; dynamic analysis of linear elastic systems (CDC6600; FORTRAN IV), 8:21311 (R:US)
M0555;ACT1; loss-of-coolant accident analysis (CDC6600; FORTRAN IV), 8:20563 (R:US)
M0648; one-dimensional slab transport with slowing down (CDC6600; FORTRAN IV), 8:22461 (R:US)
M0661;M0657;M0626; polynomial curve fitting (CDC6600; FORTRAN IV), 8:22829 (R:US)
M0678;FUGIT1; dynamic response of elastic structures (CDC6600; FORTRAN IV), 8:21437 (R:US)
M0756;LETO; one-dimensional slab gamma-ray transport (CDC6600; FORTRAN IV), 8:22462 (R:US)
M0807; two-dimensional diffusion absorption removal cross sections (CDC6600; FORTRAN IV), 8:22446 (R:US)
M0899;hoh; steam tables 14.5-2538 psia (CDC6600; FORTRAN IV), 8:21150 (R:US)
MACH1; one-dimensional, multigroup diffusion is slabs, cylinders, and spheres (CDC6500;IBM360,370/195; FORTRAN IV (CDC6500, IBM360-98%), BAL (IBM360-2%)), 8:22439 (R:US)
MANE1; rectangular magnetic network solution (CDC6600; FORTRAN IV), 8:21327 (R:US)
MANTA; steady-state thermal-hydraulic analysis (GE635;CDC6600,7600; FORTRAN IV), 8:20597 (R:US)
MAPPER; report-quality graphics on command (IBM360,370;DEC10; FORTRAN IV), 8:22869 (R:US)
MARIAH - a finite-element computer program for incompressible porous-flow problems: user's manual, 8:21427 (R:US)
MC-2; fast neutron spectra & multigroup cross section (IBM360,370;CDC7600; FORTRAN IV (99nd Assembly language (1IBM370), FORTRAN IV (99) and COMPASS (1) (CDC7600).), 8:22465 (R:US)
MICHRD; microhardness measurement analysis (GE625,635; FORTRAN IV), 8:21039 (R:US)
MINPACK1; nonlinear equations & least squares (IBM360,370 (designed to be machine-independent); FORTRAN IV), 8:22855 (R:US)
MINX; multigroup crosssections from ENDF/B-IV data (CDC7600;IBM370; FORTRAN IV (H compiler) and BAL (IBM370), FORTRAN IV (RUN or FTN compiler) and COMPASS (CDC7600)), 8:22507 (R:US)
MIRAB;MIRAP; containment system iodine removal (CDC6400; FORTRAN IV), 8:20656 (R:US)
MNN; solution of close coupling equations (CDC7600,CYBER175,74; FORTRAN IV), 8:22339 (R:US)
MOCARS; mc distribution & simulation limits (CDC CYBER76;CDC7600; FORTRAN IV (76%) and COMPASS (24%)), 8:22861 (R:US)
MOD5; stochastic model of neutron slowing-down (IBM360; FORTRAN IV), 8:22502 (R:US)
MOST; a multidimensional optimization scheme (CDC6600; FORTRAN IV), 8:22834 (R:US)
MUCHA1;MUCHA2; multiple channel analysis emergency core cooling (CDC6400; FORTRAN IV), 8:20658 (R:US)
MULTI; multi-level resonance theory cross section calculations (CDC6600; FORTRAN IV), 8:20550 (R:US)
MUSCAT; view factor shielding code cavity geometry (UNIVAC1108; FORTRAN IV), 8:22438 (R:US)
PHENIX; 2-dimensional diffusion burnup refueling history (CDC6600; FORTRAN IV), 8:20408 (R:US)

Manuals
Users manual for YIELD: timber-yield forecasting and planning tool, Version 1.2, 8:21932 (R:US)

N Codes
HRG3; slowing-down spectrum, multigroup constants (UNIVAC1108;IBM360,370; FORTRAN IV), 8:20531 (R:US)
NASA; MHD-modified chemical equilibrium code (IBM370,303x; FORTRAN (42%) and PL/I (58%)), 8:21419 (R:US)
NJOY; neutron & photon crosssections from ENDF/B (CDC7600; American National Standard X3.9-1966 FORTRAN language is used with a few exceptions, such as CDC overlay commands, mixed-mode arithmetic, and expressions as array indices. Machine-dependent functions such as timing, input-output, and character manipulation are isolated in special subroutines. Changes required for IBM implementation are denoted by 'CIBM' comment cards. Some loops have been rearranged to facilitate vectorization.), 8:22513 (R:US)
NOAH; one-dimensional, one-group space-time diffusion feedback (CDC6600; FORTRAN IV), 8:22485 (R:US)
NOISY1; auto- and cross-spectral densities (UNIVAC1108; FORTRAN V), 8:20536 (R:US)
NOWIG; one-dimensional, two-group kinetics with temperature feedback (CDC6600; FORTRAN IV), 8:22471 (R:US)
NPRFCCP; fuel cycle costs performance data (CDC6600;IBM360,370/195; FORTRAN IV), 8:20466 (R:US)
NURLOC-1.0; loss-of-coolant thermal analysis (CDC6400; FORTRAN IV), 8:20319 (R:US)

Number Codes
3DDT; 3-dimensional multigroup diffusion xyz or r-theta-z (CDC6600; FORTRAN IV), 8:20528 (R:US)
DOT2DB; 2-dimensional multigroup diffusion & SN theory (GE635; FORTRAN IV), 8:22498 (R:US)
GAPER2D; 2-dimensional perturbation calculation from 2DF output (UNIVAC1108; FORTRAN V), 8:20532 (R:US)
PHENIX; 2-dimensional diffusion burnup refueling history (CDC6600; FORTRAN IV), 8:20408 (R:US)

O Codes
ESP; Monte Carlo reactor analysis calculation (IBM360/75,91; FORTRAN IV and BAL), 8:20545 (R:US)
KENO2;KENO4; Monte Carlo multigroup criticality code (IBM360;CDC6600; FORTRAN IV and Assembly language (IBM360), FTN FORTRAN with COMPASS subroutine (CDC6600)), 8:21329 (R:US)
OCTAVIA; pressure vessel failure probabilities (IBM370,303x; FORTRAN IV), 8:20573 (R:US)
OPUS; power plant performance and price study (UNIVAC1108; FORTRAN IV), 8:20469 (R:US)
ORTEP2; crystal structure illustration plots (IBM360,370,303x; FORTRAN IV (90%) and Assembly language (10%)), 8:22547 (R:US)
ORTHIS;ORTHAT; 2-dimensional heat conduction (IBM360; FORTRAN IV and BAL), 8:20662 (R:US)

User's guide for 10 CFR 61 impact analysis codes (INTRUDE; GRWATER;OPTIONS;INVERSI;INVERSW), 8:19882 (R:US)

P Codes

Computing minimum cost fire protection (PROTECT computer code), 8:21353 (R:US)
CRECT;CHECKER;RIGEL;PLOTFB; LISTFC;DICTION;SLAVE3;DAMMET ENDF/B V2 processing codes (CDC6600;IBM360; FORTRAN IV), 8:22349 (R:US)
EPOCH; neutron age calculation of ENDF/B data (CDC6600; FORTRAN IV), 8:20321 (R:US)
KAPLPLOT; KAPL CalComp plotting routines (CDC6600; FORTRAN IV and ASCENT), 8:22837 (R:US)
KENO2;KENO4; Monte Carlo multigroup criticality code (IBM360;CDC6600; FORTRAN IV and Assembly language (IBM360), FTN FORTRAN with COMPASS subroutine (CDC6600)), 8:21329 (R:US)
PABLM; accumulated environment radiation dose (UNIVAC1100; FORTRAN), 8:21944 (R:US)
PACTOLUS;CLOTHO; nuclear power plant cost code (UNIVAC1108; FORTRAN V), 8:20475 (R:US)
PAD; one-dimensional coupled Sn neutronics & hydrodynamics (CDC7600,6600,6400; FORTRAN IV (RUN compiler)), 8:20671 (R:US)
PAMA; preferred acquisition method analysis (CDC6600; COBOL), 8:22849 (R:US)
PARTI; optimal group or mesh collapsing (CDC6500; FORTRAN IV), 8:22488 (R:US)
PASOLE; simulation of passive solar systems (CDC6600,7600;IBM360,370,3033; FORTRAN IV), 8:20080 (R:US)
PAX03; harmony-PDQ cross section generation code (CDC6600; FORTRAN IV and COMPASS), 8:22489 (R:US)
PC; coupled molecular scattering equations (CDC7600,CYBER175; FORTRAN IV), 8:22335 (R:US)
PDFPLOT; statistical distribution functions (CDC CYBER76;CDC7600; FORTRAN IV (88%) and COMPASS (12%)), 8:22846 (R:US)
PDQ8;PDQ7; one, two, or three-dimensional, few group (CDC7600,6600,CYBER175,170;IBM360; PDQ8 - FORTRAN and COMPASS (RUN and FTN compatible); PDQ7 - FORTRAN IV and COMPASS (CDC CYBER175), FORTRAN FTN4.6 (CDC7600), FORTRAN IV (H) and BAL (IBM360)), 8:22444 (R:US)
PECS3; probabilistic evaluation cladding life (CDC7600; FORTRAN IV), 8:20413 (R:US)
PELE-IC; fluid-structure interaction analysis (CDC7600; FORTRAN IV), 8:21417 (R:US)
PERT4; two-dimensional perturbation in xy, rz, and r-theta geometry (UNIVAC1108; FORTRAN IV), 8:20506 (R:US)
PESTS; thermo-hydraulic system data analysis (IBM370,303x; FORTRAN IV), 8:20244 (R:US)
PHASER; phase shift cross section and polarization calculations (CDC6600; FORTRAN IV), 8:22505 (R:US)
PHENIX; 2-dimensional diffusion burnup refueling history (CDC6600; FORTRAN IV), 8:20408 (R:US)
PHROG; multi-group constant and fast spectra calculations (IBM360; FORTRAN IV), 8:20543 (R:US)
PL-MOD; fault tree analysis by modularization (IBM370,303x; PL/I), 8:22857 (R:US)
PLOT-3D; 3-dimensional plots on IBM2280 or CalComp780 (IBM360/75 with an IBM2280 film recorder or a CalComp 780 plotter; FORTRAN IV), 8:20666 (R:US)
PMS1; fast neutron polarization experiment (IBM360; FORTRAN IV(H) and BAL), 8:22500 (R:US)
PORTABLE LISP; a list-processing interpreter (CDC7600; PASCAL), 8:22844 (R:US)
POWERCO; nuclear station electricity costs (CDC6600; FORTRAN IV), 8:20471 (R:US)
PREP;KITT; system fault tree evaluation codes (IBM360;UNIVAC1108; FORTRAN IV), 8:20664 (R:US)
PSA2; stress analysis multianchor pipe system (IBM360,370; FORTRAN IV (H)), 8:20571 (R:US)
PSEUDO; statistical resonance parameter calculations (UNIVAC1108;IBM360; FORTRAN IV), 8:22450 (R:US)
PTAC11; 2-pass assembler for the PDP-11 on 360 (IBM360/75; PL/I), 8:22840 (R:US)
PWCOST; reactor fuel cycle cost calculation (UNIVAC1108; FORTRAN IV), 8:20473 (R:US)
TDOWN; spatial & composition-dependent cross sections (GE635; FORTRAN IV), 8:20541 (R:US)

Q Codes

QLEVEL; potential bound & quasibound levels (IBM370,303x; FORTRAN IV), 8:22866 (R:US)
QLN1; quantitative gamma-ray spectra analysis (UNIVAC1108,1100; FORTRAN V), 8:21567 (R:US)
QX1; quasistatic spatial reactor kinetics code (IBM360/75; FORTRAN IV), 8:20533 (R:US)

R Codes

CRECT;CHECKER;RIGEL;PLOTFB; LISTFC;DICTION;SLAVE3;DAMMET ENDF/B V2 processing codes (CDC6600;IBM360; FORTRAN IV), 8:22349 (R:US)
EPOCH; neutron age calculation of ENDF/B data (CDC6600; FORTRAN IV), 8:20321 (R:US)
GRAMP; r-m parameters of unresolved resonances (CDC6600; FORTRAN IV), 8:22387 (R:US)
HEATING5;HEATING3; 1,2, or 3-dimensional heat conduction program (IBM360,303x;CDC CYBER73;CDC7600; FORTRAN IV (95%) and Assembly language (5%) (HEATING5), FORTRAN IV (HEATING3)), 8:21414 (R:US)
INVERSE KINETICS;r102; space-independent inverse kinetics calculations (IBM360; FORTRAN IV), 8:20495 (R:US)
R101; space-independent kinetics kex options (IBM360; FORTRAN IV), 8:20500 (R:US)
RAFFLE; first flight collision probabilities for multiple-cell geometries (IBM360,370/195; FORTRAN IV and BAL), 8:20517 (R:US)
RAMP1; Reich-Moore resolved region cross-sections (CDC6600; FORTRAN IV), 8:22503 (R:US)
RAPFU; fuel cycle parameters for fast breeders (GE635; FORTRAN IV), 8:20407 (R:US)
RAPP; high-velocity flow study of steam-water mixtures (CDC6600; FORTRAN IV), 8:21409 (R:US)
RAS; reliability analysis for phased missions (CDC CYBER176;CDC7600,6600; FORTRAN IV (96%) and COMPASS (4%)), 8:20669 (R:US)
RAUMZEIT; one-dimensional time-dependent diffusion calculations (CDC6600; FORTRAN IV), 8:22464 (R:US)
REAX; resolved resonance epithermal cros sectionss (GE635; FORTRAN IV), 8:20598 (R:US)
REDUX; reactor fluctuation experiment analysis (CDC6600; FORTRAN IV), 8:20523 (R:US)
REFCO8; discounted cash flow fuel cycle cost (IBM360,370; FORTRAN IV), 8:20476 (R:US)
RELAP4/MOD6; transient thermal-hydraulic study (IBM360,370;CDC7600; FORTRAN IV (95) and BAL (5) (IBM360), FORTRAN IV (95) and COMPASS (5) (CDC7600)), 8:20320 (R:US)
RELAP5/MOD1/018; LWR loss of coolant analysis (CDC CYBER176;CDC7600; FORTRAN IV (90%) and COMPASS (10%)), 8:20673 (R:US)
RELO2; failure probability calculation by Monte Carlo (CDC6600,7600; FORTRAN IV), 8:21436 (R:US)
RELOAD FEVER; one-dimensional, few-group diffusion depletion (CDC CYBER73,175; FORTRAN IV), 8:20467 (R:US)
REPP; thermal-hydraulic water reactor design (UNIVAC1108; FORTRAN V), 8:20322 (R:US)
RESEND;ADLER; ENDF/B resonance cross section codes (CDC6600;PDP10; FORTRAN IV), 8:20529 (R:US)
RESQ2;RESQ0;DBFL; resonance integral for a hexagonal cell (CDC6600; FORTRAN IV (98%) and ASCENT (2%)), 8:20601 (R:US)
RETRAN-02: a program for transient thermal-hydraulic analysis of complex fluid-flow systems. Volume 4. Applications (PWR;BWR), 8:20689 (R:US)
RICE; primary recoil atom spectra ENDF/B data (IBM360; FORTRAN IV), 8:22497 (R:US)

RIO; power plant reliability characteristics (CDC7600,CYBER175; FORTRAN IV (86%) and COMPASS (14%)), 8:20675 (R:US)
ROPE; finding roots of a polynomial (CDC6600; FORTRAN IV), 8:22832 (R:US)
RSAC; radiological safety analysis program (IBM360; FORTRAN IV and Assembly language), 8:20652 (R:US)
SYN; 2-dimensional synthesis multigroup diffusion and 1-group depletion (GE635; FORTRAN IV and GMAP), 8:20411 (R:US)
User's manual for the bill comparison and usage modification programs. Rate-design analysis study module IV. Technical appendix to final report, 8:20850 (R:US)

S Codes

APRFX1; 99-group DLC-2B library group-collapsing (CDC6600; FORTRAN IV), 8:20530 (R:US)
CAGE;BIRD;SPEC; time-of-flight data analysis (UNIVAC1108; FORTRAN V), 8:22501 (R:US)
CRECT;CHECKER;RIGEL;PLOTFB; LISTFC;DICTION;SLAVE3;DAMMET ENDF/B V2 processing codes (CDC6600;IBM360; FORTRAN IV), 8:22349 (R:US)
EFOM 12C software: general overview. Final report, 8:22876 (R:US)
Interactive control charts using SAS82, 8:22879 (R:US)
KAPLPLOT; KAPL CalComp plotting routines (CDC6600; FORTRAN IV and ASCENT), 8:22837 (R:US)
MOD5; stochastic model of neutron slowing-down (IBM360; FORTRAN IV), 8:22502 (R:US)
NOISY1; auto- and cross-spectral densities (UNIVAC1108; FORTRAN V), 8:20536 (R:US)
RESEND;ADLER; ENDF/B resonance cross section codes (CDC6600;PDP10; FORTRAN IV), 8:20529 (R:US)
RICE; primary recoil atom spectra ENDF/B data (IBM360; FORTRAN IV), 8:22497 (R:US)
SABOR4; discrete-element analysis of thin shells (IBM360; FORTRAN IV), 8:21323 (R:US)
SAFE; fail-to-safe analysis of protective networks (UNIVAC1106,1100; FORTRAN IV, ASCII FORTRAN (FTN) compiler), 8:20670 (R:US)
SAFE-2D; plane & axisymmetric stress analysis (UNIVAC1108; FORTRAN IV), 8:21320 (R:US)
SAFE-3D; three-dimensional composite structure stress study (UNIVAC1108;IBM360; FORTRAN IV (UNIVAC1108), FORTRAN IV and BAL (IBM360)), 8:21314 (R:US)
SAFE-AXISYM; stress analysis of axisymmetric load (CDC CYBER73;CDC7600; FORTRAN IV), 8:21307 (R:US)
SAFE-CRACK; viscoelastic analysis of concrete (UNIVAC1108; FORTRAN V), 8:21434 (R:US)
SAFE-CREEP; viscoelastic analysis of concrete (UNIVAC1108; FORTRAN IV), 8:21151 (R:US)
SAFE-PLANE; plane stress analysis, two-dimensional bodies (UNIVAC1108;CDC6600; FORTRAN IV), 8:21308 (R:US)
SAFE-SHELL; stress analysis of thin shells (UNIVAC1108;CDC CYBER73;CDC7600; FORTRAN IV), 8:21309 (R:US)
SALE; analytical chemistry quality control (IBM360,3033; FORTRAN IV (97%) and Assembly language (3%)), 8:21192 (R:US)
SALE2D; general transient fluid flow algorithm (CDC7600,CYBER175; FORTRAN IV), 8:21418 (R:US)
SAMPLE; Monte Carlo uncertainty analysis code (IBM360,370,303x; FORTRAN IV), 8:22851 (R:US)
SANDIA-ORIGEN; isotope generation & depletion (CDC7600,6600,6400; FORTRAN IV (FTN4.6(439) FORTRAN compiler, optimization level 2)), 8:19901 (R:US)
SAS1A; fast reactor power and flow transients (CDC6600;IBM360/75; FORTRAN IV), 8:20519 (R:US)
SATDSK; saturated iron magnetic field study (IBM360,370,303x; FORTRAN IV (89%) and Assembly language (11%)), 8:21483 (R:US)
SCAP; point kernel single or albedo scatter (CDC7600,CYBER175; FORTRAN (99%) and COMPASS (1%)), 8:22515 (R:US)
SCORE-EVET; three-dimensional hydraulic reactor core analysis (CDC7600,CYBER175; FORTRAN IV), 8:20610 (R:US)
SCORE3; SCISRS ENDF/B graphic cross section evaluation (IBM360; FORTRAN IV and BAL), 8:22473 (R:US)
SEALSHELL2;M0110; shell stress analysis for axisymmetric loading (CDC6600,7600;IBM360; FORTRAN IV), 8:21310 (R:US)
SHAFT79; two-phase geothermal reservoir model (CDC7600; FORTRAN IV), 8:20172 (R:US)
SHELL5; thin shell 3-dimensional structural analysis (UNIVAC1108; FORTRAN V), 8:21435 (R:US)
Short term energy outlook. Volume I. Quarterly projections, 8:19710 (R:US)
SIGPLOT; resolved multilevel Briet-Wigner cross section calculations (CDC6600; FORTRAN IV), 8:22475 (R:US)
SIZZLE; one-dimensional multigroup diffusion depletion (IBM360; FORTRAN IV), 8:22426 (R:US)
SNEQ; nonlinear algebraic equation solutions and curve plotting (CDC6600; FORTRAN IV and ASCENT), 8:22827 (R:US)
SOCOOL2; sodium-fuel interaction analysis (IBM360;UNIVAC1108; FORTRAN IV), 8:20661 (R:US)
SOLA-LOOP; two-phase flow network analysis (CDC7600,6600; FORTRAN IV), 8:21416 (R:US)
SOLA-VOF; transient fluid flow free boundaries (CDC7600,CYBER175; FORTRAN FTN5 compiler), 8:21420 (R:US)
SOLCEL2; simulation of photovoltaic systems (CDC6600,7600,CYBER175; SOLCEL2 is written primarily in ANSI FORTRAN.), 8:20031 (R:US)
SOLCOST3.0; solar heating & cooling design (CDC CYBER172,175; FORTRAN IV), 8:20081 (R:US)
SOR3; stress analysis of shells of revolution (CDC6600; FORTRAN IV), 8:21306 (R:US)
SORSDB; pressure vessel stress and fatigue (CDC6600; FORTRAN IV), 8:20567 (R:US)
SPAN4; a point-kernel shield evaluation code (CDC6600; FORTRAN IV and ASCENT), 8:22499 (R:US)
SPIRT; stress-strains from transient pressures (CDC CYBER76,175; FORTRAN IV), 8:20674 (R:US)
STEAM-67; 1967 ASME steam and water properties (IBM360,370,303x; FORTRAN IV), 8:21227 (R:US)
STEM; matrix generation for a system of beams (CDC6600; FORTRAN IV), 8:21315 (R:US)
STINT3; single-channel space-time synthesis (CDC6600; FORTRAN IV), 8:22481 (R:US)
STRAP; static & dynamic structural analysis (IBM360; FORTRAN IV), 8:21438 (R:US)
SUBDOSA; external dose airborne radionuclides (UNIVAC1100; FORTRAN), 8:21942 (R:US)
SUMOR;m0271; s-wave neutron cross section calculation (CDC6600; FORTRAN IV), 8:22483 (R:US)
SUPERENERGY2; steady-state LMFBR core analysis (CDC7600,CYBER175; FORTRAN IV), 8:20415 (R:US)
SUPERTOG; ENDF/B fine-group constants generation (IBM360; FORTRAN IV (ANSI FORTRAN)), 8:22492 (R:US)
SURGTANK; reactor steam surge tank dynamics (IBM360,370; FORTRAN IV), 8:20572 (R:US)
SWAAM1; LMFBR sodium-water reaction analysis (IBM370,3033; FORTRAN IV), 8:20414 (R:US)
TEMPEST2; thermal neutron spectrum cross sections (IBM360; FORTRAN IV), 8:22424 (R:US)
TROUT; mug multigroup cross section library maintenance (GE635;UNIVAC1108; FORTRAN IV), 8:20538 (R:US)
User's guide to SOLREL: a simulation of reliability and availability of photovoltaic systems, 8:20047 (R:US)
Users' manual for SNAP/D: seismic network assessment program for detection. Final report, 8:22036 (R:US)

T Codes

ENDF/B-THERMOS; 30-group ENDF/B scattering kernels (Auxiliary program written in FORTRAN IV), 8:22506 (R:US)
ENDRUN2; multigroup constants from ENDF/B data (GE635; FORTRAN IV), 8:20412 (R:US)
ETOT2; thermal libraries from ENDF/B data (CDC7600; FORTRAN IV), 8:20542 (R:US)

INSCAT; inelastic scattering method (CDC7600,CYBER175; FORTRAN IV), 8:22337 (R:US)
SYN; 2-dimensional synthesis multigroup diffusion and 1-group depletion (GE635; FORTRAN IV and GMAP), 8:20411 (R:US)
TAC2D; steady-state and transient temperature calculations (UNIVAC1108;IBM360,370,303x; FORTRAN V (UNIVAC1108), FORTRAN IV (IBM360)), 8:21410 (R:US)
TAC3D; transient three-dimensional heat transfer program (UNIVAC1108; FORTRAN V), 8:21411 (R:US)
TACASI; analysis of resonance measurements (UNIVAC1108; FORTRAN IV), 8:22487 (R:US)
TDELAY; scattering phase shifts & time delays (IBM370,303x;CDC7600,CYBER175; FORTRAN IV), 8:22336 (R:US)
TDIST3; community energy consumption analysis (IBM370; FORTRAN IV (G-level compiler)), 8:20963 (R:US)
TDOWN; spatial & composition-dependent cross sections (GE635; FORTRAN IV), 8:20541 (R:US)
TEMCO7; temperature coefficient calculation (UNIVAC1108; FORTRAN IV), 8:22456 (R:US)
TERZAGI; isothermal fluid flow & subsidence (CDC7600,CYBER175; FORTRAN IV), 8:20173 (R:US)
THERPP; thermodynamic properties hydrocarbons (CDC7600;IBM360,370,303x; FORTRAN IV), 8:21153 (R:US)
THETA1B; fuel rod thermal response loss of coolant accidents (IBM360/75; FORTRAN IV), 8:20323 (R:US)
THREDES; one-dimensional few group diffusion design system (IBM360; FORTRAN IV), 8:20501 (R:US)
THRES2; statistical model reaction cross-sections (CDC6600;IBM360; FORTRAN IV), 8:22355 (R:US)
TIDY-J; Fortran source code editing processor (IBM360,370,303x; FORTRAN IV), 8:22856 (R:US)
TIDY3;TIDY4; utility to edit fortran source programs (CDC CYBER74,175;UNIVAC1100; FORTRAN IV (TIDY3), FORTRAN ASCII (98%), Meta-Assembler (1%), and Assembler (1%) (TIDY4)), 8:22845 (R:US)
TIGIR2; modular document information system (CDC6600; FORTRAN and ASCENT), 8:22889 (R:US)
TOAD; processing of analyzer gamma-ray spectra (UNIVAC1108; FORTRAN IV and Assembly language), 8:22348 (R:US)
TOPS; transient thermodynamics of pressurizers (CDC6600; FORTRAN IV), 8:21317 (R:US)
TOR; thermal scattering for crystalline materials (CDC6600; FORTRAN IV), 8:22546 (R:US)
TRIFIDO; pulsed neutron source data analysis (IBM360; FORTRAN IV), 8:20633 (R:AR)
TROUT; mug multigroup cross section library maintenance (GE635;UNIVAC1108; FORTRAN IV), 8:20538 (R:US)
TSN; spatially-dependent reactor kinetics (IBM360; FORTRAN IV), 8:20508 (R:US)
TSOAK-M1; analysis of fusion detritiation data (IBM370,303x; FORTRAN IV), 8:22687 (R:US)
TUBE; u-tube heat exchanger stress analysis (CDC6600; FORTRAN IV), 8:21319 (R:US)
TWIGL;TWIGGLE; two-dimensional, two-group space-time diffusion feedback (CDC6600;IBM360; FORTRAN IV), 8:22458 (R:US)
TWOTRAN2; two-dimensional, multigroup transport in xy, rz, and r theta geometries (CDC7600,6600;IBM360/195; FORTRAN IV), 8:22466 (R:US)

U Codes
UPD; source deck maintenance utility routine (IBM360,370,303x;Amdahl470; FORTRAN IV (64%) and BAL (36%)), 8:22847 (R:US)
User's manual for the bill comparison and usage modification programs. Rate-design analysis study module IV. Technical appendix to final report, 8:20850 (R:US)
UT200; DEC emulation of CDC 200 user terminal (DEC PDP-11; PAL PDP-11 assembly language), 8:22863 (R:US)

V Codes
VARI-QUIR; time-dependent, two-dimensional, multigroup diffusion (CDC6600;IBM360; FORTRAN IV), 8:22433 (R:US)
VELVET2; turbulent flow in LMFBR rod bundle (GE635; FORTRAN IV), 8:20409 (R:US)
VENUS2; 2-dimensional coupled neutronics-hydrodynamics (IBM360,370,303x;CDC7600; FORTRAN IV(H)), 8:20659 (R:US)
VIM1;VIM1X; Monte Carlo critical assembly analysis (CDC7600;IBM360; FORTRAN IV (CDC7600), FORTRAN IV and BAL (IBM360)), 8:20634 (R:US)
VMCON; nonlinearly constrained optimization (IBM370,303x; FORTRAN IV), 8:22865 (R:US)
VMOMS - A computer code for finding moment solutions to the Grad-Shafranov equation, 8:22661 (J:NL)
VUGRAPH; plots presentation-quality viewgraphs (HP9825A; HPL), 8:22854 (R:US)

W Codes
WAMPUM; fuel cycle costs performance study (CDC6600; FORTRAN IV), 8:20468 (R:US)
WASP2; water properties for safety analysis (CDC6600,7600; FORTRAN IV), 8:21152 (R:US)
WATER; steam tables at 14.5-14,500 psia and 32-472°F (CDC6600; FORTRAN IV), 8:21149 (R:US)
WECS; wind energy value to electric utilities (CDC7600,CYBER175; FORTRAN IV), 8:20206 (R:US)
WELBORE; transient wellbore fluid flow model (CDC7600,CYBER175; FORTRAN IV), 8:20174 (R:US)
WELWING; material buckling cylindrical fuel elements (IBM360; FORTRAN IV), 8:20603 (R:US)
WHAM6; liquid-filled piping system analysis (IBM360,370;CDC6600,7600; FORTRAN IV and BAL (IBM360), FORTRAN IV (CDC7600)), 8:20562 (R:US)
WHIP1; structural deflection due to blowdown (CDC6600,7600; FORTRAN IV), 8:21330 (R:US)
WIGL2; one-dimensional, two-group space-time diffusion (CDC6600;UNIVAC1108;IBM370; FORTRAN IV), 8:22443 (R:US)

X Codes
KAPLPLOT; KAPL CalComp plotting routines (CDC6600; FORTRAN IV and ASCENT), 8:22837 (R:US)
RICE; primary recoil atom spectra ENDF/B data (IBM360; FORTRAN IV), 8:22497 (R:US)

Y Codes
KAPLPLOT; KAPL CalComp plotting routines (CDC6600; FORTRAN IV and ASCENT), 8:22837 (R:US)
Users manual for YIELD: timber-yield forecasting and planning tool, Version 1.2, 8:21932 (R:US)

Z Codes
APRFX1; 99-group DLC-2B library group-collapsing (CDC6600; FORTRAN IV), 8:20530 (R:US)

COMPUTER GRAPHICS
BL47; drafting tool to plot plane structures (CDC6600; FORTRAN IV), 8:21318 (R:US)
DATATRAN2 RAD1 Geometry Modules; radial geometry modules for two-dimensional imput (CDC6600,7600; FORTRAN (90), COMPASS (5), DATATRAN2 (5)), 8:21325 (R:US)
FIGS; IBM360 and 2250 FORTRAN graphics subroutines (IBM360; FORTRAN IV and BAL), 8:22836 (R:US)
FLOCHT; computer drawn flow charts & diagrams (DEC PDP10 with IBM360,370 or 303x; FORTRAN IV (99%), Assembly language (1%)), 8:22870 (R:US)
GENED ENVIRONMENTAL ROUTINES; subroutine library (GE635; FORTRAN IV and GMAP), 8:22839 (R:US)
GRAIL; a device-independent graphics language (CDC6600,7600; FORTRAN IV (81%) and COMPASS (19%)), 8:22860 (R:US)
GWCORE; GSPC 79 core graphics routines package (DEC VAX11/780; The device-independent part of GWCORE is written solely in VAX11/780 FORTRAN IV-Plus. There is very limited use of FORTRAN 77 IF-THEN-ELSE control structures and CHARACTER data types. The Tektronix 4012 driver is written in FORTRAN. The Ramtek 9400 driver is written in C.), 8:22858 (R:US)
KAPLPLOT; KAPL CalComp plotting routines (CDC6600; FORTRAN IV and ASCENT), 8:22837 (R:US)

MAPPER; report-quality graphics on command (IBM360,370;DEC10; FORTRAN IV), 8:22869 (R:US)
PLOT-3D; 3-dimensional plots on IBM2280 or CalComp780 (IBM360/75 with an IBM2280 film recorder or a CalComp 780 plotter; FORTRAN IV), 8:20666 (R:US)
VUGRAPH; plots presentation-quality viewgraphs (HP9825A; HPL), 8:22854 (R:US)
Computer Codes
Interactive control charts using SAS82, 8:22879 (R:US)
COMPUTER LANGUAGES
See PROGRAMMING LANGUAGES
COMPUTER PROGRAMMING
See PROGRAMMING
COMPUTER PROGRAMS
See COMPUTER CODES
COMPUTERS
See also MICROPROCESSORS
Procurement
PAMA; preferred acquisition method analysis (CDC6600; COBOL), 8:22849 (R:US)
Reliability
Description of criteria and testing methods for the hardware and software of microcomputer systems in applications relating to the safeguarding of systems in accordance with safety regulations, 8:22884 (TG:GB)
Research Programs
Report for 1979-1980, 1980-1981 of the Division of Engineering and Applied Science at the California Institute of Technology (California Institute of Technology), 8:21303 (R:US)
Testing
Description of criteria and testing methods for the hardware and software of microcomputer systems in applications relating to the safeguarding of systems in accordance with safety regulations, 8:22884 (TG:GB)
CONCENTRATING COLLECTORS
Design
PKI collector, 8:20122 (RA:US)
Field Tests
PKI solar thermal plant evaluation at Capitol Concrete Products, Topeka, Kansas, 8:20089 (RA:US)
Fresnel Reflectors
PKI collector, 8:20122 (RA:US)
Manufacturing
PKI collector, 8:20122 (RA:US)
Performance
Development of a consensus standard for determining thermal performance of high-concentration-ratio solar collectors, 8:20135 (R:US)
Performance Testing
Verification testing of the PKI collector at Sandia National Laboratories, Albuquerque, New Mexico, 8:20124 (RA:US)
CONCENTRATIONS (RADIONUCLIDES)
See RADIOACTIVITY
CONCENTRATOR SOLAR CELLS
Prior to July, 1979 SOLAR CELLS or specific solar cells descriptors and SOLAR CONCENTRATORS were used to index this concept.
Economics
PV concentrator array power costs, 8:20046 (R:US)
CONCRETES
Dimensions, Volume 65, Number 3, 8:20131 (R:US)
Creep
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  Studies of flue gas desulfurization at Louisville Gas and Electric's Paddy's Run Station: Volume I. Carbide and commercial lime testing. Final report Mar 75-Feb 1978, 8:20302 (R:US)
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Evaluation of plasma jet ignition for improved performance of alternate fuels. Final report Feb-Aug 82, 8:19946 (R:US)

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Depth to and concentrations of water in large bodies of silicic magma. Progress report, July 1, 1982-June 30, 1983, 8:20147 (R:US)

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Boiler Fuels
- Prospects for increasing the direct use of coal in industrial boilers. Final task report Nov 79-Nov 80, 8:19641 (R:US)

Boilers
- Environmental assessment of stationary source Nox control technologies. Final report Jun 76-Sep 79, 8:20305 (R:US)
- Field test results of eighteen industrial coal stoker fired boilers for emission control and improved efficiency. Paper 81.35.3, 8:19593 (J:US)
- Industrial boiler combustion modification Nox controls. Volume I: environmental assessment. Final report Jan 78-Jul 79, 8:21460 (R:US)
- Industrial boiler combustion modification Nox controls. Volume II: stoker-coal-fired boiler field test - Site A. Final report Jul 78-Jul 79, 8:21461 (R:US)
- Industrial boiler combustion modification Nox controls. Volume III: stoker-coal-fired boiler field test - Site B. Final report Jul 78-Jul 79, 8:21462 (R:US)
- Industrial firing of coal-oil mixtures (Fuel oils to coal or to COM; dependence on original boiler design), 8:19632 (R:US)

Capitalized Cost
- Regulatory impact analysis of the national ambient air quality standards for carbon monoxide. Final report, 8:21466 (R:US)

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- An assessment of central-station congeneration systems for industrial complexes. Final report Mar 76-Mar 78, 8:20277 (R:US)
- Assessment of electric-utility ownership and operation of industrial-cogeneration facilities. Final report, 8:20815 (R:US)

Combustors
- Wood-fuel use in Papua New Guinea: an assessment of industrial combustion equipment, 8:20900 (R:US)

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- General-purpose transportation and storage simulator for the SRC-I Demonstration Plant (Fuel supplies, product and by-product storage; materials handling and transport and terminal facilities and equipment), 8:19475 (RA:US)

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- Environmental assessment of stationary source Nox control technologies. Final report Jun 76-Sep 79, 8:20305 (R:US)
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- Industrial boiler combustion modification Nox controls. Volume II: stoker-coal-fired boiler field test - Site A. Final report Jul 78-Jul 79, 8:21461 (R:US)
- Industrial boiler combustion modification Nox controls. Volume III: stoker-coal-fired boiler field test - Site B. Final report Jul 78-Jul 79, 8:21462 (R:US)
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Heat Recovery Equipment
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- Regulatory impact analysis of the national ambient air quality standards for carbon monoxide. Final report, 8:21466 (R:US)

Process Control
- Multivariable process control: a survey (396 references), 8:19685 (R:US)

Risk Assessment
- Technical risks and Constitutional Law, 8:22895 (RA:DE:In German)

Solar Drying
- Solar energy applications at Army Ammunition Plants. Technical report, 8:20079 (R:US)

Solar Process Heat
- Capitol Concrete Solar Industrial Process Heat Experiment. Final technical report, May 30-November 24, 1982, 8:20086 (R:US)
- Solar energy applications at Army Ammunition Plants. Technical report, 8:20079 (R:US)

Solar Space Heating
- Solar energy applications at Army Ammunition Plants. Technical report, 8:20079 (R:US)

Solar Water Heating
- Solar energy applications at Army Ammunition Plants. Technical report, 8:20079 (R:US)

Waste Heat
- Application of thermal energy storage to process heat recovery, Phase III, heat exchanger evaluation, 8:20964 (R:US)

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Technology Assessment
- Determination of material properties by limited scan x-ray tomography. Final technical report Sep 79-Jan 81, 8:21911 (R:US)

Tomography
- Determination of material properties by limited scan x-ray tomography. Final technical report Sep 79-Jan 81, 8:21911 (R:US)

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- Portable linear accelerator development. Final report (PWR; BWR), 8:20328 (R:US)

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- Potential for industrial cogeneration development by 1990. Executive summary, 8:20968 (R:US)

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- Pacific northwest industrial energy load analysis. Final report May 81-Feb 82, 8:19760 (R:US)

Fuel Substitution
- Substitution of coal for petroleum in 'other industries', 8:20809 (R:XE:In German)

Heat Pumps
- An assessment of vapor compression heat pump technology and applications for industrial processes. Final report Nov 80-Feb 82, 8:20975 (R:US)

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Review and evaluation of automotive fuel conservation technologies. Volume I: summary. Final report Mar 79-Sep 81, 8:21018 (R:US)
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Industrial hygiene survey of the General Electric Company, Hudson Falls, New York, Fort Edward, New York. Report for Jun 76-Apr 77, 8:22007 (R:US)
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Small-Scale Hydroelectric Power Demonstration Project. Public Service Company of New Hampshire Drop No. 1 power plant expansion of Garvins Falls hydroelectric plant. Final technical and construction cost report, 8:19960 (R:US)

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    Development of gas phase metallized plaques for electrodes of storage batteries, in particular for nickel oxide electrodes. Final Report, Jul. 1979, 8:20742 (R:DE:In several languages)
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    Development of gas phase metallized plaques for electrodes of storage batteries, in particular for nickel oxide electrodes. Final Report, Jul. 1979, 8:20742 (R:DE:In several languages)
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Air Pollution Abatement
Effects of fuel properties and atomization parameters on Nox control for heavy liquid fuel fired package boilers. Final report Jan 77-Jan 79, 8:21459 (R:US)
Thirty-day field tests of industrial boilers: site 5 - gas-fired low-Nox burner. Final report Mar 79-Mar 80, 8:21457 (R:US)
Thirty-day field tests of industrial boilers: site 6 - gas-fired fire-tube boiler. Final report mar 79-mar 80, 8:21458 (R:US)
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Acid rain: control strategies for utility boilers. Volume II. Appendices, 8:19578 (R:US)
Combustion modification controls for stationary gas turbine. Volume I: environmental assessment. Final report Feb 78-Jun 80, 8:21756 (R:US)
Combustion modification Nox controls for utility boilers. Volume I: tangential coal-fired unit field test. Final report Jul 78-Jul 79, 8:20293 (R:US)
Combustion modification Nox controls for utility boilers. volume II: pulverized-coal wall-fired unit field test. Final report Jul 78-Jul 79, 8:20294 (R:US)
Combustion modification Nox controls for utility boilers. Volume III: residual oil wall-fired unit field test. Final report Jul 78-Jul 79, 8:20295 (R:US)
Combustion characterization of coals for industrial applications. Third quarterly progress report, 1 October 1982-31 December 1982 (Staged combustion), 8:19635 (R:US)
Environmental assessment of stationary source Nox control technologies. Final report Jun 76-Sep 79, 8:20305 (R:US)
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Fluidised-bed combustion. Burning coal-water mixtures in a pressurised fluidised bed: some initial results, 8:21451 (R:US)
Harrington Station Unit 2 fabric filter system special testing report. Final report Dec 78-Jul 81, 8:20296 (R:US)
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Impact of Nox selective catalytic reduction processes on flue gas cleaning systems. Final report Oct 80-Oct 81, 8:20304 (R:US)
Industrial boiler combustion modification Nox controls. Volume I: environmental assessment. Final report Jan 78-Jul 79, 8:21460 (R:US)
Industrial boiler combustion modification Nox controls. Volume II: stoker-coal-fired boiler field test - Site A. Final report Jul 78-Jul 79, 8:21461 (R:US)
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Technical progress report for the quarter, 1 April-30 June 1982, 8:19858 (R:US)
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Waste isolation: a bibliography (1024 citations), 8:19828 (R:US)
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Area environmental characterization report of the Dalhart and Palo Duro basins in the Texas Panhandle. Volume I. Dalhart Basin, 8:19859 (R:US)
Basalt Waste Isolation Project drilling and testing. Quarterly report, April 1, 1982-June 30, 1982, 8:19864 (R:US)
Basalt Waste Isolation Project drilling and testing. Quarterly report, July 1, 1982-September 30, 1982, 8:19865 (R:US)
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NRC TLD (thermoluminescent dosimeter) direct radiation monitoring network. Technical progress report Jul-Dec 81, 8:21806 (R:US)
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	8:22302	SLAC-PUB—3003
	8:22303	SLAC-PUB—3015
	8:22318	Physical Review [Section] D: Particles and Fields 26 NO. 12. 3661-3673 (15 Dec 1982).
	8:22319	Physical Review [Section] D: Particles and Fields 26 NO. 12. 3689-3700 (15 Dec 1982).
	8:22320	SLAC-PUB—2966
	8:22321	SLAC-PUB—3006
AC03-78SF02034	**Gas-Cooled Reactor Associates, La Jolla, CA (USA)**	
	8:20392	DOE/SF/02034—T80
	Bechtel Group, Inc., San Francisco, CA (USA)	
	8:20479	BGI/GCRA—83-001
	8:20480	BGI/GCRA—83-002
	Gas-Cooled Reactor Associates, La Jolla, CA (USA)	
	8:20481	DOE/SF/02034—T81
	General Atomic Co., San Diego, CA (USA)	
	8:20484	GA/PC—000040
	Gas-Cooled Reactor Associates, La Jolla, CA (USA)	
	8:20485	GCRA—82-010-Vol.1
	8:20486	GCRA—82-011
	8:20487	GCRA—82-012
	8:20488	GCRA—82-014
	8:20489	GCRA—82-015
	United Engineers and Constructors, Inc., Philadelphia, PA (USA)	
	8:20490	GCRA/UEC—82-010
	Gas-Cooled Reactor Associates, La Jolla, CA (USA)	
	8:20688	DOE/SF/02034—T82
AC03-81SF11503	**Radian Corp., Austin, TX (USA)**	
	8:20175	DOE/SF/11503—T2
AC04-76DP00053	**Monsanto Research Corp., Miamisburg, OH**	
	8:19448	DOE/METC—82-51(Sep 1982).
	Monsanto Research Corp., Miamisburg, OH (USA). Mound	
	8:19855	MLM—3045
	8:21077	MLM—3041
	8:21652	MLM-MU—83-62-0001
AC04-76DP00487	**Mason and Hanger-Silas Mason Co., Inc., Amarillo, TX (USA)**	
	8:21651	MHSMP—83-03

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AC04-76DP00613	**Bendix Corp., Kansas City, MO (USA)**	
	8:21155	BDX—613-2713
AC04-76DP00656	**General Electric Co., St. Petersburg, FL (USA). Neutron Devices Dept.**	
	8:21431	GEPP-TIS—699
	8:21443	GEPP-TIS—667a
AC04-76DP00789	**Sandia National Labs., Albuquerque, NM (USA)**	
	8:19613	SAND—82-2949
	Sandia National Labs., Livermore, CA (USA)	
	8:19642	SAND—82-8035
	Sandia National Labs., Albuquerque, NM (USA)	
	8:19767	SAND—82-0282C
	8:19814	SAND—80-2517
	8:19866	SAND—79-0269
	8:19867	SAND—82-0793
	8:19868	SAND—82-2413C
	8:19883	NUREG/CR—2394
	8:20020	SAND—82-7133
	8:20046	SAND—82-1790C
	Battelle Columbus Labs., OH (USA)	
	8:20047	SAND—82-7152
	Sandia National Labs., Albuquerque, NM (USA)	
	8:20048	SAND—83-0155C
	8:20132	SAND—82-1970C
	Budd Co., Fort Washington, PA (USA). Technical Center	
	8:20133	SAND—82-7109
	Sandia National Labs., Albuquerque, NM (USA)	
	8:20134	SAND—83-1060C
	8:20182	SAND—81-1795C
	8:20183	SAND—82-1616
	8:20184	SAND—83-0422C
	8:20317	SAND—82-2852C
	Human Performance Technologies, Inc., Thousand Oaks, CA (USA)	
	8:20348	SAND—82-7056
	Sandia National Labs., Albuquerque, NM (USA)	
	8:20574	NUREG/CP—0036
	8:20722	NUREG/CR—3069-Vol.1
	8:20723	NUREG/CR—3069-Vol.2
	Texas A and M Univ., College Station (USA). Dept. of Chemical Engineering	
	8:20752	SAND—83-7013C
	8:21134	Ferroelectrics 40 65-70 (1982).
	Sandia National Labs., Albuquerque, NM (USA)	
	8:21166	SAND—82-2810C
	8:21167	SAND—82-2986C
	8:21171	Applied Physics Letters 42 NO. 6. 530-532 (15 Mar 1983).
	8:21172	Applied Physics Letters 42 NO. 5. 445-447 (1 Mar 1983).
	8:21259	Journal of Catalysis 76 NO. 2. 450-465 (Aug 1982).
	8:21273	SAND—82-3002C
	Sandia National Labs., Livermore, CA (USA)	
	8:21302	SAND—83-8208
	Sandia National Labs., Albuquerque, NM (USA)	
	8:21351	SAND—81-2029
	8:21352	SAND—82-0053
	8:21353	SAND—82-0809
	8:21427	SAND—79-1623(Rev.)
	8:21447	SAND—83-6000(Jan 1983).
	8:21464	SAND—82-0599
	8:21477	SAND—82-2900C
	8:21630	SAND—82-2918
	8:21631	SAND—82-2937C
	8:21639	SAND—82-2002C
	8:22055	Geophysical Surveys 5 3-36 (1982).
	8:22236	Physics of Fluids 26 NO. 2. 391-392 (Feb 1983).
	8:22558	SAND—82-1907C
	8:22877	SAND—83-0269C
AC04-76DP03533	**Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant**	
	8:19802	RFP—3311
	8:19863	RFP—3492
	Rockwell International Corp., Golden, CO (USA). Energy Systems Group	
	8:20205	RFP—3386
	Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant	
	8:20209	RFP—3448
	8:20236	RFP—3383
	Rockwell International Corp., Golden, CO (USA). Wind Energy Research Center	
	8:20237	RFP—3449
	Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant	
	8:21084	RFP—3329
	8:21085	RFP—3486
AC04-76EV01013	**Lovelace Biomedical and Environmental Research Inst., Albuquerque, NM**	
	8:21260	American Industrial Hygiene Association Journal NO. 43. 250-253 (Apr 1982).
	8:21779	Environmental Science and Technology 16 NO. 9. 633-635 (Sep 1982).
	8:21929	Advances in Veterinary Science and Comparative Medicine 26 35-77 (1982).
	8:22010	Journal of Toxicology and Environmental Health 10 NO. 2. 201-221 (Aug 1982).
	8:22012	Archives of Environmental Health 37 NO. 4. 201-206 (Jul 1982).
	8:22015	Proceedings of the Western Pharmacology Society 25 197-199 (1982).
	8:22016	
	8:22017	Archives of Environmental Contamination and Toxicology 11 363-371 (1982).
	8:22018	Archives of Environmental Contamination and Toxicology 11 547-551 (1982).
AC04-78AL10752	**New Mexico Health and Environment Dept., Santa Fe (USA). Environmental Improvement Div.**	
	8:19816	DOE/AL/10752—19
	8:22028	DOE/AL/10752—17
AC04-78CS24280	**Acurex Corp., Mountain View, CA (USA). Alternate Energy Div.**	
	8:20033	DOE/CS/24280—2
AC04-81AL17575	**United Technologies Corp., East Hartford, CT (USA). Research Center**	
	8:21011	DOE/AL/17575—T1
AC04-82AL19929	**Solar Energy Industries Association, Washington, DC (USA)**	
	8:19971	DOE/AL/19929—T3
	Nossaman-Krueger and Knox, Washington, DC (USA)	
	8:20055	DOE/AL/19929—T7
AC04-82AL20601	**Applied Concepts Corp., Woodstock, VA (USA)**	
	8:20086	DOE/AL/20601—T1
AC05-76ET10143	**Ashland Synthetic Fuels, Inc., KY (USA)**	
	8:19427	DOE/ET/10143—T31
	8:19428	DOE/ET/10143—T34
	8:19596	DOE/ET/10143—T30
AC05-76ET53036	**Institute for Fusion Studies, The University of Texas at Austin, Austin, Texas 78712**	
	8:22642	Physics of Fluids 26 NO. 2. 520-525 (Feb 1983).
AC05-76EV04763	**Federal Aviation Administration, Washington, DC (USA). Systems Research and Development Service**	
	8:19680	DOE/EV/04763—T1

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AC05-76IR05114	**Glasstone (Samuel), Oak Ridge, TN (USA)**	
	8:22822	DOE/IR/05114—1
AC05-76OR00033	**Oak Ridge Associated Universities, Inc., TN (USA)**	
	8:19759	ORAU/IEA—83-1(M)
	Oak Ridge Associated Universities, Inc., Washington, DC (USA). Inst. for Energy Analysis	
	8:21692	CONF-820970—
	Oak Ridge Associated Universities, Inc., TN (USA)	
	8:21914	ORAU—208
	8:21979	Environmental Research 28 NO. 2. 313-328 (Aug 1982).
AC05-78OR03054	**International Coal Refining Co., Allentown, PA**	
	8:19407	CONF-800878—(1980).
	International Coal Refining Co., Allentown, PA (USA)	
	8:19474	DOE/OR/03054—9
AC05-79CS56051	**Mueller Associates, Inc., Baltimore, MD (USA)**	
	8:21012	DOE/CS/56051—8
AC05-80ET13702	**Virginia Polytechnic Inst. and State Univ., Blacksburg (USA). Dept. of Materials Engineering**	
	8:19429	DOE/ET/13702—T1
AC05-82ER53131	**Austin Research Associates, Inc., TX (USA)**	
	8:22600	DOE/ER/53131—T1
AC06-76FF02170	**Hanford Engineering Development Lab., Richland, WA (USA)**	
	8:19831	HEDL-SA—2615
	8:20345	NUREG/CR—2805-Vol.2
	8:20346	NUREG/CR—2805-Vol.3
	8:20372	HEDL-TC—2274
	8:20645	HEDL-TC—1904-Pt.2-Rev.1
	8:22727	HEDL-TME—82-9
AC06-76RL01830	**Pacific Northwest Lab., Richland, WA (USA)**	
	8:19667	PNL-SA—10869
	8:19813	PNL—4555
	Battelle Memorial Inst., Columbus, OH (USA). Office of National Waste Terminal Storage Integration	
	8:19857	ONI—3
	Battelle Memorial Inst., Columbus, OH (USA). Office of Nuclear Waste Isolation	
	8:19858	ONWI—9(82-3)
	NUS Corp., Gaithersburg, MD (USA)	
	8:19859	ONWI—102-Vol.1
	8:19860	ONWI—102-Vol.2
	Pacific Northwest Lab., Richland, WA (USA)	
	8:19884	NUREG/CR—2675
	8:19894	PNL-SA—10696
	8:19897	NUREG/CR—2935
	8:20018	PNL—4593
	8:20019	PNL-SA—11039
	8:20185	Journal of Heat Transfer 104 NO. 1. 173-180 (Feb 1982).
	8:20193	PNL-SA—8907
	8:20214	EPRI-AP—2795
	8:20234	PNL-SA—10653
	8:20235	PNL-SA—10890
	Battelle Human Affairs Research Center, Seattle, WA (USA)	
	8:20316	NUREG/CR—2952
	Pacific Northwest Lab., Richland, WA (USA)	
	8:20327	DOE/ET/34215—31
	8:20403	NUREG/CR—2929
	8:20594	NUREG/CR—2878
	8:20716	NUREG/CR—2659
	8:20718	NUREG/CR—2800
	8:20726	PNL-SA—10409
	8:20727	PNL-SA—10557
	8:20728	PNL-SA—10833
	8:20739	PNL—4587
	8:20740	PNL-SA—11128
	Energetics, Inc., Columbia, MD (USA)	
	8:20988	PNL—4499
	Battelle Columbus Labs., OH (USA)	
	8:20989	PNL—4592
	Pacific Northwest Lab., Richland, WA (USA)	
	8:21083	PNL-SA—9287
	8:21165	PNL-SA—8737
	8:21350	PNL—4118
	8:21587	PNL-SA—10638
	8:21588	PNL-SA—10656-A
	8:21589	PNL-SA—10670
	8:21684	PNL-SA—10634
	8:21745	NUREG/CR—3106
	8:21774	PNL—4599
	8:21775	PNL-SA—10480
	8:21776	PNL-SA—10481
	8:21782	Atmospheric Environment 16 NO. 10. 2421-2430 (1982).
	8:21865	PNL-SA—10533
	8:21971	PNL-SA—11106
	8:21983	International Journal of Biological Research in Pregnancy 2 NO. 4. 159-167 (1981).
	8:22008	PNL-SA—11110
	Law Engineering Testing Co., Marietta, GA (USA)	
	8:22034	ONWI—356
	Pacific Northwest Lab., Richland, WA (USA)	
	8:22054	PNL—4562
	Law Engineering Testing Co., Marietta, GA (USA)	
	8:22063	ONWI—355
	Pacific Northwest Lab., Richland, WA (USA)	
	8:22543	PNL-SA—10714
AC06-77RL01030	**Rockwell International Corp., Richland, WA (USA). Energy Systems Group**	
	8:19864	RHO-BW-SR—82-2-2Q-P
	8:19865	RHO-BW-SR—82-2-3Q-P
	8:19887	RHO-BW-ST—35P
	Rockwell International Corp., Richland, WA (USA). Rockwell Hanford Operations	
	8:22035	RHO-BWI-LD—9
AC07-76ID01570	**Oak Ridge National Lab., TN (USA)**	
	8:19826	DOE/LLW—16T
	EG and G Idaho, Inc., Idaho Falls (USA)	
	8:19891	DOE/LLW—17T
	8:20148	EGG—2239
	8:20355	EGG-M—19582
	8:20617	CONF-810701—7
	8:20620	NUREG/CR—3103
	Nuclear Regulatory Commission, Washington, DC (USA)	
	8:20707	NUREG/CP—0034-Vol.1(Aug 1982).
	8:20708	NUREG/CP—0034-Vol.1(Aug 1982).
	Health Physics Society, East Weymouth, MA (USA)	
	8:20710	NUREG/CP—0039(Dec 1982).
	EG and G Idaho, Inc., Idaho Falls (USA)	
	8:20715	NUREG/CR—2618
	8:20724	NUREG/CR—3126
	8:21428	Journal of Heat Transfer 104 NO. 1. 48-54 (Feb 1982).
	8:22725	EGG-FT—6138
AC07-79ET27014	**Washington Div. of Geology and Earth Resources, Olympia (USA)**	
	8:20144	DOE/ET/27014—T4
AC07-79ID01675	**Exxon Nuclear Idaho Co., Inc., Idaho Falls (USA)**	
	8:21799	ENICO—1116-Suppl.1(11-82)
	8:21871	ENICO—1116-Suppl.1-12/82
AC08-76NV01183	**EG and G, Inc., Las Vegas, NV (USA). Energy Measurements Group**	
	8:21796	EGG—1183-1835

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AC08-79ET27010	**AMAX Exploration, Inc., Golden, CO (USA)**	
	8:20154	DOE/ET/27010—1
AC08-83NV10282	**Hebrew Univ., Jerusalem (Israel)**	
	8:21570	CONF-820667—8
	EG and G, Inc., Goleta, CA (USA)	
	8:21572	DOE/NV/10282—T1
AC09-76SR00001	**Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.**	
	8:19806	DP-tr—38(1976).
	8:19829	DPST—78-296
	Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA)	
	8:20386	DP-tr—39(Sep 1982).
AC09-79ET41900	**Rockwell International Corp., Canoga Park, CA (USA). Energy Systems Group**	
	8:19821	DOE/ET/41900—16
	8:19822	DOE/ET/41900—17
	Rockwell International Corp., Thousand Oaks, CA (USA). Science Center	
	8:19823	DOE/ET/41900—18
AC13-76GJ01664	**Bendix Field Engineering Corp., Grand Junction, CO (USA)**	
	8:19789	GJBX—6(83)
	8:19790	GJBX—11(83)
	Bendix Field Engineering Corp., Grand Junction, CO (USA). Grand Junction Operations	
	8:19791	GJBX—14(83)
	Bendix Field Engineering Corp., Grand Junction, CO (USA)	
	8:19792	GJBX—379(81)
	8:19793	GJBX—380(81)
	8:19794	GJBX—381-81
	8:19795	GJBX—383(81)
AC15-76CL02395		
	8:20445	
AC15-76CL50003	**Westinghouse Electric Corp., Madison, PA (USA). Advanced Reactors Div.**	
	8:20420	CONF-821103—84
AC21-76ET12138	**West Virginia Univ., Morgantown (USA). Dept. of Geology and Geography**	
	8:22029	DOE/ET/12138—1335
AC21-76ET12140	**Cincinnati Univ., OH (USA). H.N. Fisk Lab. of Sedimentology**	
	8:19750	DOE/ET/12140—1346
AC21-80MC14110	**Burns and Roe Services Corp., Oradell, NJ (USA)**	
	8:20256	DOE/MC/14110—1227
AC21-80MC14129	**NCB (IEA Grimethorpe) Ltd., Grimethorpe (UK)**	
	8:20257	DOE/MC/14129—1312
	8:20258	DOE/MC/14129—1313
	8:20259	DOE/MC/14129—1314
	8:20260	DOE/MC/14129—1315
	8:20261	DOE/MC/14129—1316
	National Coal Board, Leatherhead (UK). Coal Utilization Research Lab.	
	8:20262	DOE/MC/14129—1317
	8:20263	DOE/MC/14129—1358
	8:21451	DOE/MC/14129—1392
AC21-80MC14273	**Mechanical Technology, Inc., Latham, NY (USA)**	
	8:19433	DOE/MC/14273—1325
AC21-80MC14361	**Physical Sciences, Inc., Woburn, MA**	
	8:19458	DOE/METC—82-51(Sep 1982).
AC21-80MC14385	**Clark Univ., Worcester, MA**	
	8:19469	DOE/METC—82-51(Sep 1982).
AC21-80MC14386	**State Univ. of New York, Buffalo**	
	8:19464	DOE/METC—82-51(Sep 1982).
AC21-80MC14399	**CNG Research Co., Cleveland, OH**	
	8:19466	DOE/METC—82-51(Sep 1982).
AC21-80MC14591	**General Electric Co., Schenectady, NY**	
	8:19444	DOE/METC—82-51(Sep 1982).
AC21-80MC14592	**Rockwell International Corp., Canoga Park, CA**	
	8:19445	DOE/METC—82-51(Sep 1982).
AC21-80MC14593	**SRI International, Menlo Park, CA**	
	8:19446	DOE/METC—82-51(Sep 1982).
AC21-80MC14705	**IGT, Chicago, IL**	
	8:19454	DOE/METC—82-51(Sep 1982).
AC21-80MC14875	**City College, New York, NY**	
	8:19452	DOE/METC—82-51(Sep 1982).
AC21-81FE05122	**Advanced Fuel Research, Inc., East Hartford, CT**	
	8:19460	DOE/METC—82-51(Sep 1982).
AC21-81FE05123	**Everett Research Lab., MA**	
	8:19451	DOE/METC—82-51(Sep 1982).
AC21-81FE05147	**McKee (Davy) Corp., Cleveland, OH (USA)**	
	8:19432	DOE/FE/05147—1371
AC21-81MC16015	**New Mexico Univ., Albuquerque (USA). Dept. of Chemical and Nuclear Engineering**	
	8:19764	DOE/MC/16015—1368-Vol.1
AC21-81MC16026	**Massachusetts Inst. of Tech., Cambridge**	
	8:19468	DOE/METC—82-51(Sep 1982).
AC21-81MC16053	**Vanderbilt Univ., Nashville, TN**	
	8:19442	DOE/METC—82-51(Sep 1982).
AC21-81MC16117	**Univ. of Pennsylvania, Philadelphia**	
	8:19440	DOE/METC—82-51(Sep 1982).
AC21-81MC16310	**Kansas State Univ., Manhattan**	
	8:19455	DOE/METC—82-51(Sep 1982).
AC21-81MC16361	**PEDCo-Environmental, Inc., Cincinnati, OH (USA)**	
	8:19578	DOE/METC—82-42-Vol.2
AC21-81MC16372	**Westinghouse Electric Corp., Pittsburgh, PA**	
	8:19462	DOE/METC—82-51(Sep 1982).
AC21-81MC16377	**Univ. of New Mexico, Albuquerque**	
	8:19450	DOE/METC—82-51(Sep 1982).
AC21-81MC16440	**Univ. of Massachusetts, Amherst**	
	8:19456	DOE/METC—82-51(Sep 1982).
AC21-81MC16441	**Research Triangle Inst., Research Triangle Park, NC**	
	8:19470	DOE/METC—82-51(Sep 1982).
AC21-81MC16447	**Dravo Engineers and Constructors, Pittsburgh, PA**	
	8:19463	DOE/METC—82-51(Sep 1982).
AC21-81MC16518	**Brigham Young Univ., Provo, UT**	
	8:19459	DOE/METC—82-51(Sep 1982).
AC21-82MC19301	**Institute of Gas Technology, Chicago, IL (USA)**	
	8:19421	CONF-821094—2
AC21-82MC19332	**Kellogg (M.W.) Co., Houston, TX (USA)**	
	8:20264	DOE/MC/19332—1319
AC22-76ET10637	**Dow Chemical Co., Midland, MI**	
	8:19548	DOE/METC—82-51(Sep 1982).
AC22-77ET11426	**Missouri Univ., Columbia (USA). Dept. of Physics**	
	8:19545	DOE/ET/11426—T2
AC22-79ET14700	**Utah Univ., Salt Lake City (USA). Dept. of Mining and Fuels Engineering**	
	8:19430	DOE/ET/14700—13

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AC22-79ET14858	**Chem Systems, Inc., Fairfield, NJ (USA). Research and Development Group**	
	8:19541	DOE/ET/14858—T2
AC22-79PC10342	**Pittsburgh Univ., PA (USA). Dept. of Chemical and Petroleum Engineering**	
	8:19553	DOE/PC/10342—T1
AC22-80ET14146	**Southern Illinois Univ., Carbondale (USA). Coal Extraction and Utilization Research Center**	
	8:19597	DOE/ET/14146—2
AC22-80PC30008	**Colorado State Univ., Fort Collins (USA). Dept. of Chemistry**	
	8:19554	DOE/PC/30008—T6
AC22-80PC30013	**Pennsylvania State Univ., University Park (USA). Coal Research Section**	
	8:19555	DOE/PC/30013—F2-Pt.2
AC22-80PC30021	**Air Products and Chemicals, Inc., Allentown, PA (USA)**	
	8:19933	DOE/PC/30021—T11
AC22-80PC30027	**Conoco, Inc., Library, PA (USA). Coal Research Div.**	
	8:19513	DOE/PC/30027—35
AC22-80PC30054	**Missouri Univ., Columbia (USA). Dept. of Physics**	
	8:19556	DOE/PC/30054—T1
AC22-80PC30075	**Massachusetts Inst. of Tech., Cambridge (USA)**	
	8:21250	DOE/PC/30075—12
AC22-80PC30088	**Chicago Univ., IL (USA)**	
	8:19514	DOE/PC/30088—11
AC22-80PC30153	**Mitre Corp., McLean, VA (USA). METREK Div.**	
	8:20900	DOE/PC/30153—T1
AC22-80PC30252	**Duquesne Univ., Pittsburgh, PA (USA). Dept. of Chemistry**	
	8:19558	DOE/PC/30252—T9
AC22-80PC30292	**Physical Sciences, Inc., Andover, MA (USA)**	
	8:21296	DOE/PC/30292—8
AC22-81PC30019	**Chem Systems, Inc., Tarrytown, NY (USA)**	
	8:19947	DOE/PC/30019—T4
AC22-81PC40267	**Combustion Engineering, Inc., Windsor, CT (USA)**	
	8:19635	DOE/PC/40267—3
AC22-81PC40276	**Science Applications, Inc., Chatsworth, CA (USA). Combustion Science and Advanced Technology Dept.**	
	8:19934	DOE/PC/40276—T1
AC22-81PC40280	**United Technologies Research Center, East Hartford, CT (USA)**	
	8:19636	DOE/PC/40280—T7
AC22-81PC40785	**SRI International, Menlo Park, CA (USA)**	
	8:19515	DOE/PC/40785—6
AC22-81PC41760	**Kentucky Univ., Lexington (USA). Dept. of Metallurgical Engineering and Materials Science**	
	8:19516	DOE/PC/41760—T3
AC22-81PC42295	**TRW Energy Development Group, Redondo Beach, CA (USA)**	
	8:19620	DOE/PC/42295—T6
AC22-82PC50261	**Energy and Environmental Engineering, Inc., Cambridge, MA (USA)**	
	8:19637	DOE/PC/50261—T1
AI01-76ET12548	**Jet Propulsion Lab., Pasadena, CA (USA)**	
	8:19608	DOE/ET/12548—16
AI01-76ET20320	**Budd Co., Fort Washington, PA (USA). Technical Center**	
	8:20211	DOE/NASA/0129—1
	National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center	
	8:20212	DOE/NASA/20320—43
AI01-77CS51040	**Mechanical Technology, Inc., Latham, NY (USA)**	
	8:21021	DOE/NASA/0032—15
AI01-77CS51044	**General Motors Corp., Indianapolis, IN (USA). Detroit Diesel Allison Div.**	
	8:21013	DOE/NASA/0187—82/1
AI01-77ET10769	**Arkansas State Univ., State University (USA). Dept. of Chemistry**	
	8:20877	DOE/NASA/3249—1
AI01-79ER10060	**Little (Arthur D.), Inc., Cambridge, MA (USA)**	
	8:22023	DOE/ER/10060—T1
AI01-81CS66001	**Chem Systems, Inc., Tarrytown, NY (USA)**	
	8:19992	DOE/JPL—9950-776
	Bend Research, Inc., OR (USA)	
	8:20971	DOE/JPL—9950-691
AI04-80AL12726	**Charles River Associates, Inc., Boston, MA (USA)**	
	8:20888	DOE/NASA/0251—1
AI08-79DP40092	**Naval Research Lab., Washington, DC (USA)**	
	8:22741	NRL-MR—5003
AI09-80SR10702	**Forest Service, Asheville, NC (USA). Southeastern Forest Experiment Station**	
	8:21930	DOE/SR/10702—3
AI22-80PC30258		
	8:19536	
AM01-79PE70106	**Energy and Environmental Policy Center, Cambridge, MA (USA)**	
	8:20826	DOE/PE/70106—1
AM03-76SF00010	**Los Alamos National Lab., NM (USA)**	
	8:21578	LA—9572-C-Vol.2(Nov 1982).
	8:22644	Physics of Fluids 26 NO. 2. 535-544 (Feb 1983).
	8:22650	Journal of Nuclear Materials 111 34-38 (Nov-Dec 1982).
AM03-76SF00113	**Departments of Materials Science and Mechanical Engineering, University of Southern California, Los**	
	8:21632	Review of Scientific Instruments 54 NO. 3. 353-356 (Mar 1983).
AM03-76SF00767	**Department of Applied Physics, California Institute of Technology, Pasadena, California 91125**	
	8:22646	Physics of Fluids 26 NO. 2. 563-570 (Feb 1983).
AM03-76SF00893	**General Electric Co., Sunnyvale, CA (USA). Advanced Reactor Systems Dept.**	
	8:20416	ARSD-SP—029
AM06-76RL02227	**International Lab. of Marine Radioactivity, Monaco**	
	8:21926	Environmental Science and Technology 16 NO. 9. 579-581 (Sep 1982).
AM21-78MC08216	**Science Applications, Inc., Fort Collins, CO (USA)**	
	8:19763	DOE/MC/08216—1352
	Science Applications, Inc., Steamboat Springs, CO (USA)	
	8:19768	DOE/MC/08216—1330
	8:19769	DOE/MC/08216—1332
AS05-76ER04936	**University of Tennessee, Knoxville, Tennessee 37996**	
	8:21635	Physical Review [Section] A: General Physics 26 NO. 4. 1975-1983 (Oct 1982).
	Tennessee Univ., Knoxville (USA). Dept. of Physics and Astronomy	
	8:22343	DOE/ER/04936—8
AS05-77CS40094	**Georgia Inst. of Tech., Atlanta (USA). Engineering Experiment Station**	
	8:20966	DOE/CS/40094—T1
	Georgia Inst. of Tech., Atlanta (USA). Engineering Experiment Station	
	8:20967	DOE/CS/40094—T2
AS05-78EV05784	**Florida State Univ., Tallahassee (USA)**	
	8:22193	DOE/EV/05784—5

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AS05-79ER10361	**Texas A and M Univ., College Station (USA). Center for Tectonophysics**	
	8:22057	DOE/ER/10361—T1
AS05-79ER10459	**Louisiana State Univ., Baton Rouge (USA). Dept. of Physics and Astronomy**	
	8:21441	DOE/ER/10459—38
AS05-80ER10676	**Toledo Univ., OH (USA). Dept. of Physics and Astronomy**	
	8:22599	DOE/ER/10676—3
AS05-80ER10710	**Middle Tennessee State Univ., Murfreesboro (USA)**	
	8:22358	DOE/ER/10710—3
AS05-81ER10893	**Texas Univ., Austin (USA)**	
	8:22190	DOE/ER/10893—1
AS05-81ER40008	**Florida Univ., Gainesville (USA). Dept. of Physics**	
	8:22283	DOE/ER/40008—29
AS05-82ER53134	**Auburn Univ., AL (USA). Dept. of Physics**	
	8:22601	DOE/ER/53134—1
AS07-77ET28365	**Colorado Geological Survey, Denver (USA)**	
	8:20145	DOE/ET/28365—T2
AS08-81DP40137	**Aerospace and Energetics Research Program, University of Washington, Seattle, Washington 98195**	
	8:22638	Physics of Fluids 26 NO. 2. 354-356 (Feb 1983).
AS08-81DP40166	**California Univ., Los Angeles (USA). Dept. of Electrical Engineering**	
	8:22703	DOE/DP/40166—1
AS20-81LC10519	**Univ. of Missouri, Columbia**	
	8:21223	Analytical Letters 15 NO. 12A. 1017-1029 (1982).
AT03-76ET13332	**Resource Planning Associates, Inc., Cambridge, MA (USA)**	
	8:20968	DOE/ET/13332—T2
AT03-76ET35300	**General Atomic Co., San Diego, CA (USA)**	
	8:20482	GA/PC—000007
AT03-76ET51011	**GA Technologies, Inc., San Diego, CA (USA)**	
	8:22604	GA-A—16984
	8:22726	GA-A—16818
AT03-76EV70272	**California Univ., Berkeley (USA)**	
	8:21826	DOE/EV/70272—T1
AT03-76SF70046	**General Atomic Co., San Diego, CA (USA)**	
	8:20483	GA/PC—000008
AT04-81AL16228	**Jet Propulsion Lab., Pasadena, CA (USA)**	
	8:20056	DOE/JPL—1060-52
AT21-81MC14731	**West Virginia Univ., Morgantown (USA). Dept. of Chemical Engineering**	
	8:19434	DOE/MC/14731—1297
FC01-77CS30007	**Sea Loft Restaurant, Long Branch, NJ (USA)**	
	8:20087	DOE/CS/30007—T1
	8:20111	CAPE—2805(28 Nov 1982).
FC01-80ET23197	**Semix, Inc., Gaithersburg, MD (USA)**	
	8:19988	DOE/ET/23197—T10
FC03-77CS31499	**San Diego Unified School District, CA (USA)**	
	8:20117	CAPE—2769([nd]).
FC03-78CS32125	**Big Green Investments, Denver, CO (USA)**	
	8:20118	CAPE—2765([nd]).
FC05-81OR20807	**Tri-State Synfuels Co., Houston, TX (USA)**	
	8:19489	DOE/OR/20807—T1-Vol.1A
	8:19490	DOE/OR/20807—T1-Vol.1B
	8:19491	DOE/OR/20807—T1-Vol.1C
	8:19492	DOE/OR/20807—T1-Vol.2A
	8:19493	DOE/OR/20807—T1-Vol.2B
	8:19494	DOE/OR/20807—T1-Vol.2-Summ.
	8:19495	DOE/OR/20807—T1-Vol.3
	8:19496	DOE/OR/20807—T1-Vol.3A
	Kentucky Dept. of Energy, Lexington (USA)	
	8:19497	DOE/OR/20807—T1-Vol.4
	Tri-State Synfuels Co., Houston, TX (USA)	
	8:19498	DOE/OR/20807—T1-Vol.4A
	8:19499	DOE/OR/20807—T1-Vol.4B
	8:19500	DOE/OR/20807—T1-Vol.5(Commercial)
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	8:19506	DOE/OR/20807—T1-Vol.9B
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	8:19508	DOE/OR/20807—T1-Vol.11A
	8:19509	DOE/OR/20807—T1-Vol.11B
	8:19510	DOE/OR/20807—T1-Vol.11C
	8:19511	DOE/OR/20807—T1-Vol.12
	8:19512	DOE/OR/20807—T1-Vol.14
	8:19535	DOE/OR/20807—T1-Vol.5-(Proj.Review)
	8:19549	DOE/OR/20807—T1-Vol.1(Commercial)
	8:19550	DOE/OR/20807—T1-Vol.1(Sampling)
	8:19551	DOE/OR/20807—T1-Vol.2
	8:19552	DOE/OR/20807—T1-Vol.13
	8:19610	DOE/OR/20807—T1-Vol.2C
FC07-80ID12122	**Public Service Co. of New Hampshire, Manchester (USA)**	
	8:19960	DOE/ID/12122—T1
FC07-80ID12162	**Eastern Products Corp., Andover, MA (USA)**	
	8:20969	DOE/ID/12162—T2
FC07-80ID12163	**National-Standard Co., Niles, MI (USA)**	
	8:20970	DOE/ID/12163—T1
FC21-80MC14400	**TRW, Inc., Redondo Beach, CA**	
	8:19449	DOE/METC—82-51(Sep 1982).
FG01-80EI10672	**Maryland Univ., College Park (USA). Coll. of Business and Management**	
	8:20790	DOE/EIA—0267
FG01-80RA50314	**District of Columbia Dept. of Environmental Services, Washington, DC (USA)**	
	8:20999	DOE/RA/50314—1
FG01-80RA50377	**Nashville Electric Service, TN (USA)**	
	8:21000	DOE/RA/50377—3
FG01-81RA50362	**Nokota Co., Bismarck, ND (USA)**	
	8:19948	DOE/RA/50362—1395-Vol.1
	Williams Bros. Engineering Co., Tulsa, OK (USA)	
	8:19949	DOE/RA/50362—1395-Vol.4
FG02-79R510109	**Evanston, City of, IL (USA)**	
	8:20213	DOE/R5/10109—1
FG02-79R510141	**Crosby Gardens, Toledo, OH (USA)**	
	8:20127	DOE/R5/10141—T1
FG02-81R510319	**Akron Univ., OH (USA). Dept. of Electrical Engineering**	
	8:20889	DOE/R5/10319—1
FG02-81R510323	**Columbus Zoological Gardens, Powell, OH (USA)**	
	8:20115	CAPE—2773(1982).
FG02-81R510332	**Rice Lake, City of, WI (USA)**	
	8:21034	DOE/R5/10332—1
FG03-78RA23220	**National Conference of State Legislatures, Denver, CO (USA)**	
	8:19961	DOE/RA/23220—1
FG03-78SF01795	**National Conference of State Legislatures, Denver, CO (USA)**	
	8:20164	DOE/SF/01795—1
	8:20165	DOE/SF/01795—3
FG03-80RA50236	**National Conference of State Legislatures, Denver, CO (USA)**	
	8:20835	DOE/RA/50236—1
FG05-80ET53088	**Institute for Fusion Studies, University of Texas at Austin, Austin, Texas 78712**	
	8:22643	Physics of Fluids 26 NO. 2. 526-534 (Feb 1983).
FG05-80IR10903		
	8:20776	
FG07-81ID12328	**Connecticut Univ., Storrs (USA)**	
	8:19989	DOE/ID/12328—T1
FG07-81ID12331	**Kansas State Univ., Manhattan (USA). Dept. of Chemical Engineering**	
	8:19990	DOE/ID/12331—T1

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FG07-81ID12341	**Iowa Univ., Iowa City (USA). Div. of Energy Engineering**	
	8:20088	DOE/ID/12341—T1
FG07-81ID12342	**Lehigh Univ., Bethlehem, PA (USA). Biotechnology Research Center**	
	8:19991	DOE/ID/12342—T1
FG22-78ET13350	**Alaska Univ., Fairbanks (USA). Mineral Industry Research Lab.**	
	8:19615	DOE/ET/13350—T5
	8:19616	DOE/ET/13350—T6
FG22-78ET13380	**Univ. of North Dakota, Grand Forks**	
	8:21255	Journal of Organic Chemistry 47 NO. 22. 4250-4254 (22 Oct 1982).
FG22-80PC30210	**Ohio Univ., Athens**	
	8:19547	DOE/METC—82-51(Sep 1982).
FG22-80PC30214	**Lehigh Univ., Bethlehem, PA (USA). Dept. of Mechanical Engineering and Mechanics**	
	8:20265	DOE/PC/30214—T5
FG22-80PC30219	**Washington Univ., St. Louis, MO**	
	8:19461	DOE/METC—82-51(Sep 1982).
FG22-80PC30225	**West Virginia Univ., Morgantown (USA). Dept. of Physics**	
	8:19557	DOE/PC/30225—T4
FG22-80PC30229	**Massachusetts Inst. of Tech., Cambridge**	
	8:19467	DOE/METC—82-51(Sep 1982).
FG22-81PC40786	**Brown Univ., Providence, RI**	
	8:19441	DOE/METC—82-51(Sep 1982).
FG22-81PC40792	**Rice Univ., Houston, TX**	
	8:19436	DOE/METC—82-51(Sep 1982).
FG22-81PC40803	**Brown Univ., Providence, RI (USA). Div. of Engineering**	
	8:19560	DOE/PC/40803—T5
FG22-81PC40804	**Illinois Univ., Urbana (USA). Dept. of Mechanical and Industrial Engineering**	
	8:21335	DOE/PC/40804—T5
FG22-81PC40809	**Brigham Young Univ., Provo, UT (USA). Dept. of Chemistry**	
	8:19561	DOE/PC/40809—T5
FG22-81PC40810	**North Dakota Univ., Grand Forks (USA)**	
	8:19562	DOE/PC/40810—4
FG22-82PC50794	**Arizona Univ., Tucson (USA). Dept. of Chemical Engineering**	
	8:19517	DOE/PC/50794—T1
FG22-82PC50807	**Duke Univ., Durham, NC (USA). Dept. of Chemistry**	
	8:19563	DOE/PC/50807—T1
NAS-7-100-954373	**Crystal Systems, Inc., Salem, MA (USA)**	
	8:19993	DOE/JPL/954373—81/19
NAS-7-100-956046	**Cornell Univ., Ithaca, NY (USA). Dept. of Materials Science and Engineering**	
	8:19994	DOE/JPL/956046—82/5
NAS-7-100-956061	**Solarelectronics, Inc., Bellingham, MA (USA)**	
	8:19995	DOE/JPL/956061—6
NAS-7-100-956312	**Mobil Solar Energy Corp., Waltham, MA (USA)**	
	8:19996	DOE/JPL/956312—82/01
	8:19997	DOE/JPL/956312—83/02
NAS-7-100-956352	**Spire Corp., Bedford, MA (USA)**	
	8:19998	DOE/JPL/956352—1
W-31-109-ENG-38	**Argonne National Lab., IL (USA)**	
	8:19419	CONF-810417—11
	8:19420	CONF-810528—17
	8:19422	CONF-821145—4
	USDOE Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness, Washington, DC. Office of the Deputy Assistant Secretary for Environment, Safety and Health	
	8:19576	CONF-8205161—1
	Argonne National Lab., IL (USA)	
	8:19594	ANL/EES-TM—206
	8:19595	CONF-821175—1
	8:19626	ANL/FE—80-10-Add.
	8:19799	CONF-8106164—3
	8:19879	ANL/EIS—16
	8:19880	ANL/EIS—17
	8:19889	ANL—83-6
	8:19890	DOE/EV—0005/22
	8:19895	CONF-821119—13
	8:19984	CONF-821012—5
	8:19985	CONF-8208114—1
	8:20071	CONF-820814—41
	8:20084	CONF-811034—2
	8:20194	CONF-8209108—1
	8:20242	ANL/FE—80-10
	8:20245	CONF-820966—2
	8:20324	CONF-810234—2
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	8:20421	CONF-821119—12
	8:20449	CONF-820619—2
	8:20477	CONF-8208117—1
	Commission of the European Communities, Karlsruhe (Germany, F.R.). European Inst. for Transuranium Elements	
	8:20611	CONF-820360—3
	Argonne National Lab., IL (USA)	
	8:20635	CONF-811215—13
	8:20636	CONF-820406—25
	8:20637	CONF-820406—26
	8:20638	CONF-820649—3
	8:20639	CONF-821104—3
	8:20640	CONF-821155—2
	National Atomic Energy Agency, Jakarta (Indonesia). Research Centre for Nuclear Techniques	
	8:20641	CONF-821155—3
	Argonne National Lab., IL (USA)	
	8:20642	CONF-821155—4
	National Atomic Energy Agency, Jakarta (Indonesia). Research Centre for Nuclear Techniques	
	8:20643	CONF-821155—5
	Kyoto Univ., Kumatori, Osaka (Japan). Research Reactor Inst.	
	8:20644	CONF-821155—6
	Argonne National Lab., IL (USA)	
	8:20676	CONF-800804—44
	8:20677	CONF-811003—6
	8:20678	CONF-820406—24
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	8:20681	CONF-820802—53
	8:20682	CONF-820810—15
	8:20683	CONF-820901—7
	Kyoto Univ., Kumatori, Osaka (Japan). Research Reactor Inst.	
	8:20684	CONF-820901—8
	Argonne National Lab., IL (USA)	
	8:20685	CONF-820985—3
	8:20686	CONF-8106164—4
	8:20687	CONF-8109206—1
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	Oklahoma City Univ., OK (USA)	
	8:20770	CONF-811275—1
	Argonne National Lab., IL (USA)	
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	8:20788	CONF-8110257—2
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	8:20868	CONF-810639—6
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	8:20872	CONF-820645—6
	8:20873	CONF-820645—7
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	8:20886	CONF-8104192—1
	8:20893	ANL/ENG—82-03
	8:20895	CONF-810295—1
	8:20897	CONF-8106188—1
	8:20945	CONF-820128—4
	8:20946	CONF-820128—5
	Barton-Aschman Associates, Inc., Evanston, IL (USA)	
	8:20947	CONF-820128—6
	Argonne National Lab., IL (USA)	
	8:20961	ANL—83-8
	8:20962	ANL/ENG—82-01
	8:20965	CONF-8204112—1
	Environmental Protection Agency, Cincinnati, OH (USA). Industrial Environmental Research Lab.	
	8:20996	CONF-820627—13
	Argonne National Lab., IL (USA)	
	8:21026	CONF-810111—4
	8:21027	CONF-8104190—1
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	Geneva Univ. (Switzerland)	
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	Argonne National Lab., IL (USA)	
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	8:21064	CONF-8208118—1
	8:21065	CONF-8210116—2
	8:21108	
	8:21111	Physica Scripta 25 873-878 (1982).
	8:21119	CONF-820325—13
	8:21120	CONF-820929—11
	8:21121	CONF-8206160—1
	Commission of the European Communities, Karlsruhe (Germany, F.R.). European Inst. for Transuranium Elements	
	8:21156	CONF-821107—50
	Argonne National Lab., IL (USA)	
	8:21157	CONF-8107103—1
	8:21181	Physical Review [Section] B: Condensed Matter 26 NO. 10. 5688-5693 (15 Nov 1982).
	8:21194	CONF-810346—2
	8:21196	CONF-811160—5
	8:21197	CONF-8203115—1
	8:21220	Physical Review Letters 49 NO. 22. 1631-1635 (29 Nov 1982).
	8:21225	Annual Review of Nuclear Science 32 NO. 1. 1-34 (1982).
	8:21228	CONF-810294—1
	Illinois Univ., Chicago (USA). Dept. of Chemistry	
	8:21249	CONF-8105105—7
	Argonne National Lab., IL (USA)	
	8:21263	CONF-8103158—1
	8:21278	CONF-8109205—1
	8:21279	CONF-8109205—3
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	8:21569	CONF-811012—66
	National Lab. for High Energy Physics, Oho, Ibaraki (Japan)	
	8:21571	CONF-8206118—10
	Argonne National Lab., IL (USA)	
	8:21625	CONF-821227—1
	Illinois Univ., Chicago (USA). Dept. of Physics	
	8:21679	CONF-820810—16
	Argonne National Lab., IL (USA)	
	8:21690	CONF-810808—12
	8:21691	CONF-820627—12
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	8:21897	CONF-8210129—1
	8:21945	CONF-820451—2
	8:21989	CONF-820275—2
	8:21990	CONF-821071—2
	8:22011	Biophysical Journal 39 NO. 1. 41-47 (Jul 1982).
	8:22065	CONF-810378—3
	8:22177	CONF-810705—8
	8:22178	CONF-810728—8
	8:22179	CONF-810868—5
	8:22180	CONF-810868—7
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	8:22186	CONF-8209101—2
	8:22187	CONF-8210128—1
	8:22210	Physical Review [Section] A: General Physics 26 NO. 5. 2330-2333 (Nov 1982).
	8:22214	Physical Review [Section] A: General Physics 26 NO. 4. 1984-1987 (Oct 1982).
	8:22216	Physical Review [Section] A: General Physics 26 NO. 4. 2274-2276 (Oct 1982).
	8:22351	CONF-820828—8
	Princeton Univ., NJ (USA). Dept. of Physics	
	8:22352	DOE/NBM—3007675
	Argonne National Lab., IL (USA)	
	8:22356	CONF-820896—6
	8:22357	CONF-8110242—2
	8:22368	CONF-8110181—4
	8:22374	CONF-820896—5
	8:22375	CONF-821143—4
	8:22383	CONF-8206132—2
	8:22385	ANL/NDM—74
	8:22393	Physical Review Letters 49 NO. 24. 1758-1761 (13 Dec 1982).
	8:22516	CONF-811145—16
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	South Carolina Univ., Columbia (USA). Coll. of Engineering	
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	Missouri Univ., Rolla (USA). Dept. of Electrical Engineering	
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74	NTIS, PC A03/MF A01; 1	DE83007898	MN -34C	8:22385
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146	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048146	ND -2	8:20466
147	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048147	ND -2	8:22428
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168	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048168	ND -2	8:20495
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173	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048173	ND -2	8:22430
174	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048174	ND -2	8:20496
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271	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048271	ND -2	8:22442
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304	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048304	ND -2	8:20506
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310	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048310	ND -2	8:22453
311	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048311	ND -2	8:20509
313	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048313	ND -2	8:20510
316	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048316	ND -2	8:20511
317	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048317	ND -2	8:20512
318	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048318	ND -2	8:22454
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321	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048321	ND -2	8:21289
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328	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048328	ND -2	8:20319
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333	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048333	ND -2	8:22348
337R	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048337	ND -2	8:21315
338R	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048338	ND -2	8:22458
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352R	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048352	ND -2	8:22464
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364R	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048364	ND -2	8:22827
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374	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048374	ND -2	8:22472
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906R	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048906	ND -2	8:20672
907	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048907	ND -2	8:20081
908	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048908	ND -2	8:21940
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910	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048910	ND -2	8:22860
911R	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048911	ND -2	8:20994
912	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048912	ND -2	8:22861
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914R	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048914	ND -2	8:20244
915	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048915	ND -2	8:22891
916	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048916	ND -2	8:22863
917	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048917	ND -2	8:20673
918	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048918	ND -2	8:22864
919	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048919	ND -2	8:21192
920	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048920	ND -2	8:22334
921	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048921	ND -2	8:22335
922	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048922	ND -2	8:22865
923	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048923	ND -2	8:21941
924	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048924	ND -2	8:21942
925	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048925	ND -2	8:21943
926	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048926	ND -2	8:21944
927	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048927	ND -2	8:20674
928	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048928	ND -2	8:22336
929	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048929	ND -2	8:22866
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931	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048931	ND -2	8:20610
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933R	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048933	ND -2	8:22515
934R	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048934	ND -2	8:21419
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937	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048937	ND -2	8:20031
938	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048938	ND -2	8:22547
939	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048939	ND -2	8:22869
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941	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048941	ND -2	8:22338

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943	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048943	ND -2	8:20675
944	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048944	ND -2	8:21483
945	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048945	ND -2	8:22340
946	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048946	ND -2	8:22870
947	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048947	ND -2	8:22824
948	Available from NTIS and National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne Il 60539	DE83048948	ND -2	8:21420
ANL-OHS/HP-				
83-100	*See* DOE/EV-0005/22	DE83007808	STD -70A	8:19890
ARBRL-TR-				
02417	*See* AD-A-120047/6			8:19773
ARLCD-TR-				
81038	*See* AD-A-115464/0			8:20079
ARSD-SP-				
029	NTIS, PC A02/MF A01; 1	DE83005223	MN -79p	8:20416
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1746	*See* DOE/ET/34019-2	DE83007923	MN -78	8:20354
BDX-				
613-2713	NTIS, PC A03/MF A01	DE83006933	MN -25	8:21155
BEOP-				
15	NTIS (US Sales Only), PC A05/MF A01	DE83901338	MN -59a	8:19964
16	NTIS (US Sales Only), PC A05/MF A01	DE83901339	MN -60	8:20210
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5777	NTIS (US Sales Only), MF A01; 2		MN -32	8:22884
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83-001	NTIS, PC A04/MF A01; 1	DE83007130	MN -77	8:20479
83-002	NTIS, PC A06/MF A01; 1	DE83007137	MN -77	8:20480
BLL-WH-				
489-(9091.9F)	Avail: British Library Lending Div., Boston Spa, Engl.			8:21193
BMFT-FB-T-				
80-109	NTIS, PC A11/MF A01			8:20995
81-043	NTIS, PC A02/MF A01			8:21383
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81-107	NTIS, PC A04/MF A01			8:21331
81-109	NTIS, PC A05/MF A01			8:19981
81-122-VOL-1	NTIS, PC A08/MF A01			8:21276
81-124-VOL-3	NTIS, PC A10/MF A01			8:21277
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81-164	NTIS, PC A04/MF A01			8:20082
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81-119	NTIS, PC A03/MF A01			8:20053
BNL-				
32266	NTIS, PC A02/MF A01	DE83007388	MN -48	8:21896
32339	NTIS, PC A02/MF A01; 1	DE83005793	MN -11	8:21689
32344	NTIS, PC A02; 3	DE83005791	ND -28	8:21499
32407	NTIS, PC A02/MF A01	DE83005673	MN -25	8:21040
32417	NTIS, PC A02/MF A01; 1	DE83005908	MN -95d	8:20894
32460	NTIS, PC A02/MF A01; 1	DE83006303	MN -34C	8:22367
32531	NTIS, PC A02/MF A01; 1	DE83007389	MN -28	8:21472
32546	NTIS, PC A02/MF A01	DE83007394	MN -28	8:21484
32559	NTIS, PC A02/MF A01; 1	DE83007386	MN -28	8:21500
51596	NTIS, PC A05/MF A01	DE83008472	STD -90b	8:19627
51602	NTIS, PC A02/MF A01	DE83008470	STD -28	8:22249
51610	NTIS, PC A03/MF A01	DE83008471	STD -28	8:21485
51614	NTIS, PC A07/MF A01	DE83008475	STD -70	8:19818
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51635	NTIS, PC A02/MF A01	DE83008473	STD -34D	8:22342

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BNL-NUREG-				
51594	*See* NUREG/CR-2993	DE83008254	MN -78	8:20382
51600	*See* NUREG/CR-3028	DE83008246	MN -78	8:20721
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28-PT-3	*See* AD-244784/5			8:21657
CAPE-				
2677	TIC	DE83006217	ND -38	8:21430
2688	TIC	DE83006213	ND -28	8:21619
2691	TIC	DE83008117	ND -28	8:21550
2706	TIC	DE83006423	ND -96	8:21031
2711	TIC	DE83006001	ND -28	8:21497
2715	TIC	DE83008118	ND -28	8:21549
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2749	TIC	DE83005770	ND -28	8:21545
2750	TIC	DE83005771	ND -28	8:21543
2751	TIC	DE83005773	ND -28	8:21564
2752	TIC	DE83005776	ND -28	8:21563
2753	TIC	DE83005772	ND -28	8:21542
2754	TIC	DE83005777	ND -28	8:21541
2756	TIC	DE83005768	ND -28	8:21540
2758	TIC	DE83005766	ND -28	8:21539
2759	TIC	DE83005767	ND -28	8:21538
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2762	TIC	DE83005775	ND -28	8:21562
2763	TIC	DE83005774	ND -37	8:21615
2765	TIC	DE83005735	ND -59	8:20118
2768	TIC	DE83005732	ND -28	8:21537
2769	TIC	DE83005780	ND -59a	8:20117
2773	TIC	DE83004991	ND -38	8:20115
2774	TIC	DE83005036	ND -38	8:21613
2788	TIC	DE83005719		8:21531
2790	TIC	DE83005721		8:21532
2791	TIC	DE83005722		8:21561
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2803	TIC	DE83006216	ND -28	8:21618
2804	TIC	DE83006215	ND -28	8:21616
2805	TIC	DE83006509	ND -59c	8:20111
2806	TIC	DE83006823	ND -28	8:21551
2807	TIC	DE83008122	ND -28	8:21548
2808	TIC	DE83008121	ND -28	8:21546
2809	TIC	DE83007292	ND -28	8:21547
2873	TIC	DE83005679		8:21534
CEA-CONF-				
6248	NTIS (US Sales Only), MF A01; 2	DE83901343	MN -62	8:20054
CEMR-MS-				
5	NTIS, PC A03/MF A01	DE83901223	MN -96	8:20944
CERL-TR-E-				
177	*See* AD-A-115182/8			8:20891
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83/ 1	NTIS		ND -20	8:22595
CIRC-				
848-A	*See* N-8228688			8:21854
875	*See* N-8228689			8:22026
CNEN-RT/AMB-				
(81) 2	NTIS (US Sales Only), MF A01; 2	DE82903049	MN -11	8:22825
(81) 11	NTIS (US Sales Only), MF/A01; 2	DE82903052	MN -11	8:22037
CNEN-RT/BIO-				
80/ 14	NTIS (US Sales Only), MF A01; 2	DE82902805	MN -11	8:21877
CNEN-RT/EDP-				
82-1	NTIS MF A01; 2	DE83900857	MN -32	8:22871
CNEN-RT/ING-				
82-5	NTIS (US Sales Only), PC A02/MF A01; 1	DE83900867	MN -79	8:20417
CNEN-RT/PROT-				
(81) 9	NTIS (US Sales Only), MF A01; 2		ND -11	8:21675
(81) 10	NTIS (US Sales Only), MF A01; 2		MN -11	8:21676
(81) 11	NTIS (US Sales Only), MF A01; 2	DE82903025	MN -11	8:21677
(81) 12	NTIS (US Sales Only), MF A01; 2	DE82903026	MN -11	8:21678
CNES-				
81/ CT/ PRT/ SST/ SM/ 178	NTIS, PC A05/MF A01			8:20029
CONF-781247-	(2. international conference on energy storage, compression and switching, Venice, Italy, 5-8 Dec 1978)			
10	NTIS, PC A02/MF A01	DE83007777	MN -21	8:22688
CONF-790547-	(Electrochemical Society meeting, Boston, MA, USA, 7-11 May 1979)			
	See DDS-108			8:19986
CONF-790959-	(Conference on theory and applications of moment methods in many fermion systems, Iowa City, IA, USA, 10-13 Sep 1979)			
	New York, NY; Plenum Press (1980).			8:22408
CONF-800106-	(14. photovoltaics specialists conference, San Diego, CA, USA, 7-10 Jan 1980)			
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 887-892(1980)			8:20049

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CONF-800151-	(Aerospace sciences meeting, St Louis, MO, USA, 12-15 Jan 1980)			
2	NTIS, PC A02/MF A01; 1	DE83007599	MN -90g	8:20866
CONF-800205-	(American Institute of Metallurgical Engineers meeting, Las Vegas, NV, USA, 24-28 Feb 1980)			
18	NTIS, PC A02/MF A01	DE83007510	MN -25	8:21041
CONF-8006233-	(Seminar on heat treatment of heat resistant and highly heat resistant materials, Schloss Dachau, F.R. Germany, 12-13 Jun 1980)			
	NTIS, PC A03/MF A01			8:21062
CONF-8006244-	(Colloquium on power plants for pressure gasification of coal, Essen, F.R. Germany, 18 Jun 1980)			
	NTIS (US Sales Only), PC A09/MF A01; 1	DE83900169	MN -90c	8:19423
CONF-800804-	(ASME century 2 emerging technology conference, San Francisco, CA, USA, 10-22 Aug 1980)			
44	NTIS, PC A03/MF A01; 1	DE83007817	MN -79e	8:20676
CONF-800878-	(7. annual international conference on coal gasification, liquefaction, and conversion to electricity, Pittsburgh, PA, USA, 5-7 Aug 1980)			
	Univ. of Pittsburgh, Dept. of Chemical and Petroleum Engineering, Pittsburgh, PA 15261		MN -90	8:19401
CONF-800987-	(Workshop on comparative leaching behavior of radioactive waste forms, Argonne, IL, USA, 3-4 Sep 1980)			
4	*See* PNL-SA-8737	DE83002695	MN -70	8:21165
CONF-8010159-	(Fall meeting of the Electrochemical Society, Hollywood, FL, USA, 5-10 Oct 1980)			
14	NTIS, PC A03/MF A01	DE83007684	MN -94cb	8:20746
CONF-8010316-	(2. seminar of the Gesellschaft fuer Strahlen- und Umweltforschung, Neuherberg, F.R. Germany, 27-28 Oct 1980)			
	See GSF-BPT-2/81	DE83750301	MN -11	8:21712
CONF-8011177-	(Round table meeting on chemical and physical valorization of coal, Brussels, Belgium, 24-25 Nov 1980)			
	See EUR-7633-d,e,f,i			8:19519
CONF-801210-	(3. Miami international conference on alternative energy sources, Miami Beach, FL, USA, 15-17 Dec 1980)			
30	*See* PNL-SA-8907	DE83003464	MN -95c	8:20193
CONF-810111-	(Annual meeting of the Transportation Research Board, Washington, DC, USA, 12-16 Jan 1981)			
4	NTIS, PC A02/MF A01	DE83007782	MN -96	8:21026
CONF-810130-	(American Association for the Advancement of Science symposium, Toronto, Ontario, Canada, 8 Jan 1981)			
3	NTIS, PC A03/MF A01; 1	DE83007772	MN -80	8:20405
CONF-810234-	(Army Research office workshop on multiphase flow, Aberdeen Proving Ground, MD, USA, 2-4 Feb 1981)			
2	NTIS, PC A02/MF A01	DE83007778	MN -80	8:20324
CONF-810294-	(5. winter fluorine conference, Daytona Beach, FL, USA, 1-6 Feb 1981)			
1	NTIS, PC A02/MF A01	DE83007666	MN -4	8:21228
CONF-810295-	(International trade show and wood heating seminar, New Orleans, LA, USA, 21-24 Feb 1981)			
1	NTIS, PC A02/MF A01; 1	DE83007784	MN -95d	8:20895
CONF-810314-	(Particle accelerator conference, Washington, DC, USA, 11-13 Mar 1981)			
175	NTIS, PC A02/MF A01	DE83007798	MN -28	8:21501
CONF-810340-	(7. international conference on magnet technology, Karlsrube, F.R. Germany, 30 Mar-3 Apr 1981)			
	IEEE Trans. Magn., MAG-17: No. 5, 1541-1550(Sep 1981)			8:22764
	IEEE Trans. Magn., MAG-17: No. 5, 1695-1698(Sep 1981)			8:22765
	IEEE Trans. Magn., MAG-17: No. 5, 1703-1706(Sep 1981)			8:22766
CONF-810346-	(Instrument Society of America symposium, St Louis, MO, USA, 23-26 Mar 1981)			
2	NTIS, PC A02/MF A01	DE83007781	MN -90i	8:21194
CONF-810378-	(12. lunar and planetary science conference, Houston, TX, USA, 16-20 Mar 1981)			
3	NTIS, PC A03/MF A01	DE83007665	MN -34B	8:22065
CONF-8103158-	(Workshop on molecular electronic devices, Washington, DC, USA, 23-24 Mar 1981)			
1	NTIS, PC A02/MF A01	DE83007780	MN -4	8:21263
2	NTIS, PC A02/MF A01	DE83007779	MN -4	8:21264
CONF-810417-	(90. AICHE national meeting, Houston, TX, USA, 5-9 Apr 1981)			
11	NTIS, PC A02/MF A01; 1	DE83007791	MN -90	8:19419
CONF-810497-	(International symposium on metal-hydrogen systems, Miami Beach, FL, USA, 13-15 Apr 1981)			
3	NTIS, PC A02/MF A01; 1	DE83007773	MN -94	8:21332
(Absts.)	Univ. of Miami, Clean Energy Research Inst., P.O. Box 248294, Coral Gables, FL 33124, $35.00		MN -94d	8:19929
CONF-8104107-	(20. annual Kentucky industrial coal conference, Lexington, KY, USA, 29-30 Apr 1981)			
10	Central Soya Company, Inc., Fort Wayne, IN 46802		ND -90	8:19631
CONF-8104190-	(8. annual meeting of National Organization of Black Chemists and Chemical Engineers, Chicago, IL, USA, 22-25 Apr 1981)			
1	NTIS, PC A02/MF A01	DE83007600	MN -96	8:21027

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CONF-8104192-	(Forum on fuel cell and secondary batteries for load leveling, Tokyo, Japan, 13-14 Apr 1981)			
1	NTIS, PC A02/MF A01	DE83007753	MN -93	8:20886
CONF-810528-	(83. symposium on nucleation and crystallization in glasses, Washington, DC, USA, 3-6 May 1981)			
17	NTIS, PC A03/MF A01	DE83007742	MN -90c	8:19420
CONF-8105105-	(Symposium on electrocatalyis, Minneapolis, MN, USA, 10-15 May 1981)			
6	NTIS, PC A02/MF A01	DE83007646	MN -94cc	8:20747
7	NTIS, PC A02/MF A01; 1	DE83007590	MN -4	8:21249
CONF-8105203-	(2. prompt fussion neutron uranium logging seminar, Albuquerque, NM, USA, 19-20 May 1981)			
	See SAND-82-2002C	DE83007368	MN -51	8:21639
CONF-810606-	(American Nuclear Society's annual meeting, Miami Beach, FL, USA, 7-12 Jun 1981)			
70	NTIS, PC A03/MF A01; 1	DE81024248	MN -70	8:19819
CONF-810614-	(16. thermophysics conference, Palo Alto, CA, USA, 23-25 Jun 1981)			
7	NTIS, PC A02/MF A01; 1	DE83007650	MN -90g	8:20867
CONF-810631-	(74. annual meeting of the Air Pollution Control Association, Philadelphia, PA, USA, 21-26 Jun 1981)			
	Proc., Annu. Meet., Air Pollut. Control Assoc., vp(1981)			8:19593
	Proc., Annu. Meet., Air Pollut. Control Assoc., vp(1981)			8:19605
	Proc., Annu. Meet., Air Pollut. Control Assoc., vp(1981)			8:19606
	Proc., Annu. Meet., Air Pollut. Control Assoc., vp(1981)			8:19738
	Proc., Annu. Meet., Air Pollut. Control Assoc., vp(1981)			8:19958
7	NTIS, PC A02/MF A01; 1	DE83007648	MN -98A	8:20805
CONF-810639-	(19. symposium on the engineering aspects of magnetohydrodynamics, Tullahoma, TN, USA, 15-17 Jun 1981)			
6	NTIS, PC A02/MF A01; 1	DE83007934	MN -90g	8:20868
CONF-810664-	(5. AIAA computational fluid dynamics conference, Palo Alto, CA, USA, 22-23 Jun 1981)			
3	NTIS, PC A02/MF A01; 1	DE83007656	MN -90g	8:20869
CONF-8106100-	(International conference on laser spectroscopy, Alberta, Canada, 29 Jun-3 Jul 1981)			
6	NTIS, PC A02/MF A01; 1	DE83007690	MN -4	8:22182
CONF-8106160-	(American conference on theoretical chemistry, Boulder, CO, USA, 21-27 Jun 1981)			
	J. Phys. Chem., 86: No. 12, 2232-2239(10 Jun 1982)			8:21236
	J. Phys. Chem., 86: No. 12, 2244-2251(10 Jun 1982)			8:21237
	J. Phys. Chem., 86: No. 12, 2113-2117(10 Jun 1982)			8:21238
	J. Phys. Chem., 86: No. 12, 2118-2124(10 Jun 1982)			8:21239
	J. Phys. Chem., 86: No. 12, 2182-2187(10 Jun 1982)			8:21240
	J. Phys. Chem., 86: No. 12, 2187-2190(10 Jun 1982)			8:21241
	J. Phys. Chem., 86: No. 12, 2252-2261(10 Jun 1982)			8:21242
CONF-8106164-	(National Bureau of Standards joint conferences: 8. symposium on thermophysical properties; 17. thermal conductivity conference; 8. thermal expansion conference, Gaithersburg, MD, USA, 15-18 Jun 1981)			
3	NTIS, PC A03/MF A01; 1	DE83007926	MN -34C	8:19799
4	NTIS, PC A03/MF A01	DE83007935	MN -80	8:20686
CONF-8106181-	(Health physics summer school on selected topics in reactor health physics, Lexington, KY, USA, 14-19 Jun 1981)			
	See NUREG/CP-0039	DE83900961	MN -41	8:20709
CONF-8106188-	(Workshop on the electric imperative, Monterey, CA, USA, Jun 1981)			
1	NTIS, PC A02/MF A01; 1	DE83007873	MN -95d	8:20897
CONF-8106270-	(DOE contractor's workshop on particulate sampling and characterization, Morgantown, WV, USA, 16-17 Jun 1981)			
	See DOE/METC-83-51	DE83005672	MN -90i	8:21699
CONF-810701-	(Computer simulation conference, Washington, DC, USA, 15-17 Jul 1981)			
7	NTIS, PC A02/MF A01; 1	DE83008449	MN -78	8:20617
CONF-810705-	(16. annual conference of the Microbeam Analysis Society, Vail, CO, USA, 13-17 Jul 1981)			
8	NTIS, PC A02/MF A01	DE83007870	MN -80	8:22177
CONF-810728-	(9. international conference on atomic collisions in solids, Lyon, France, 6-10 Jul 1981)			
8	NTIS, PC A03/MF A01; 1	DE83007937	MN -34A	8:22178
CONF-810770-	(Summer institute on particle physics, Stanford, CA, USA, 27 Jul-7 Aug 1981)			
	See SLAC-245	DE82012505	MN -34D	8:22301
CONF-8107103-	(International conference on the applied Mossbauer spectroscopy, Kashmir, India, 13-17 Jul 1981)			
1	NTIS, PC A02/MF A01	DE83007593	MN -4	8:21157
CONF-810808-	(Energy in the man-built environment: the next decade specialty conference, Vail, CO, USA, 3-5 Aug 1981)			
12	NTIS, PC A02/MF A01	DE83007403	MN -11	8:21690
CONF-810812-	(IECEC conference, Atlanta, GA, USA, 9-14 Aug 1981)			
47	NTIS, PC A02/MF A01; 1	DE83007874	MN -90g	8:20870
CONF-810831-	(Fusion reactor materials meeting, Seattle, WA, USA, 9-12 Aug 1981)			
90	*See* PNL-SA-9287	DE82012860	ND -20c	8:21083
99	NTIS, PC A02/MF A01	DE83007654	MN -25	8:21042
100	NTIS, PC A02/MF A01; 1	DE83007871	MN -20c	8:22689

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101	NTIS, PC A02/MF A01	DE83007829	MN -20c	8:22690
102	NTIS, PC A02/MF A01	DE83007834	MN -20c	8:21043
104	NTIS, PC A02/MF A01	DE83007803	MN -20c	8:21044
CONF-810835-	(1981 cryogenic engineering conference, San Diego, CA, USA, 10-14 Aug 1981)			
47	NTIS, PC A02/MF A01	DE83007932	MN -38	8:21502
CONF-810868-	(6. international conference on fast ion beam spectroscopy, Quebec, Canada, 17-20 Aug 1981)			
5	NTIS, PC A02/MF A01	DE83007927	MN -34A	8:22179
7	NTIS, PC A02/MF A01; 1	DE83007928	MN -34A	8:22180
CONF-8108102-	(5. international summer institute for surface sciences, Milwaukee, WI, USA, 23-28 Aug 1981)			
2	NTIS, PC A03/MF A01	DE83007869	MN -80	8:21063
CONF-810940-	(Annual contractors' review meeting on thermal and chemical storage, Tysons Corner, VA, USA, 16 Sep 1981)			
12	NTIS, PC A02/MF A01	DE82000166	MN -94a	8:20964
13	NTIS, PC A02/MF A01	DE82000117	MN -94a	8:20736
CONF-810987-	(29. midwest solid state conference, Chicago, IL, USA, 24-26 Sep 1981)			
2	NTIS, PC A02/MF A01; 1	DE83007852	MN -28	8:21503
CONF-8109188-	(Conference on aerosols in science and technology - aerosols in and from in and from industrial processes, Duisburg, F.R. Germany, 23-25 Sep 1981)			
	Bad Soden, Germany; Gesellschaft fuer Aerosolforschung e.V. (1981).			8:21674
CONF-8109205-	(NATO Advanced Study Institute conference on fast processes and labile species in chemistry and molecular biology using ionizing radiation, Capri, Italy, 7-10 Sep 1981)			
1	NTIS, PC A02/MF A01; 1	DE83007707	MN -4	8:21278
2	NTIS, PC A02/MF A01	DE83007867	MN -4	8:21513
3	NTIS, PC A02/MF A01; 1	DE83007802	MN -80	8:21279
4	NTIS, PC A02/MF A01	DE83007868	MN -80	8:21280
5	NTIS, PC A03/MF A01; 1	DE83007828	MN -80	8:21281
CONF-8109206-	(7. international heat transfer conference, Munich, F.R. Germany, 6-10 Sep 1981)			
1	NTIS, PC A02/MF A01	DE83007706	MN -79p	8:20687
CONF-811003-	(ASNT fall conference, Atlanta, GA, USA, 12-15 Oct 1981)			
6	NTIS, PC A02/MF A01; 1	DE83007755	MN -79p	8:20677
CONF-811012-	(IEEE symposium on nuclear science, San Francisco, CA, USA, 21-23 Oct 1981)			
65	NTIS, PC A02/MF A01	DE83007653	MN -37	8:21568
66	NTIS, PC A02/MF A01	DE83007686	MN -37	8:21569
CONF-811034-	(2. national technical conference on earth sheltered buildings, Tulsa, OK, USA, 16-17 Oct 1981)			
2	NTIS MF A01; 2	DE83007647	MN -59a	8:20084
CONF-811037-	(TMS/AIME fall meeting on advanced techniques for the characterization of hydrogen in metals, Louisville, KY, USA, 11-15 Oct 1981)			
6	NTIS, PC A02/MF A01; 1	DE83006974	MN -25	8:21195
CONF-811040-	(9. symposium on engineering problems of fusion research, Chicago, IL, USA, 26-29 Oct 1981)			
	Proc. Symp. Eng. Probl. Fusion Res., 1498-1501(1981)			8:21535
	Proc. Symp. Eng. Probl. Fusion Res., 285-288(1981)			8:21614
	Proc. Symp. Eng. Probl. Fusion Res., 1086-1089(1981)			8:21622
	Proc. Symp. Eng. Probl. Fusion Res., 507-510(1981)			8:22668
	Proc. Symp. Eng. Probl. Fusion Res., 688-691(1981)			8:22669
	Proc. Symp. Eng. Probl. Fusion Res., 704-707(1981)			8:22670
	Proc. Symp. Eng. Probl. Fusion Res., 1905-1908(1981)			8:22671
	Proc. Symp. Eng. Probl. Fusion Res., 1063-1066(1981)			8:22672
	Proc. Symp. Eng. Probl. Fusion Res., 1067-1070(1981)			8:22673
	Proc. Symp. Eng. Probl. Fusion Res., 1082-1085(1981)			8:22674
	Proc. Symp. Eng. Probl. Fusion Res., No. 81, 1106-1109(1981)			8:22675
	Proc. Symp. Eng. Probl. Fusion Res., 1118-1121(1981)			8:22676
	Proc. Symp. Eng. Probl. Fusion Res., 1126-1129(1981)			8:22677
	Proc. Symp. Eng. Probl. Fusion Res., 1130-1133(1981)			8:22678
	Proc. Symp. Eng. Probl. Fusion Res., 1134-1137(1981)			8:22679
	Proc. Symp. Eng. Probl. Fusion Res., 487-490(1981)			8:22680
	Proc. Symp. Eng. Probl. Fusion Res., 491-494(1981)			8:22681
	Proc. Symp. Eng. Probl. Fusion Res., 511-514(1981)			8:22682
	Proc. Symp. Eng. Probl. Fusion Res., 1506-1509(1981)			8:22787
	Proc. Symp. Eng. Probl. Fusion Res., 1709-1712(1981)			8:22788
	Proc. Symp. Eng. Probl. Fusion Res., 1051-1054(1981)			8:22789
	Proc. Symp. Eng. Probl. Fusion Res., 1055-1057(1981)			8:22790
	Proc. Symp. Eng. Probl. Fusion Res., 1071-1073(1981)			8:22791
	Proc. Symp. Eng. Probl. Fusion Res., 1078-1081(1981)			8:22792
	Proc. Symp. Eng. Probl. Fusion Res., 1122-1125(1981)			8:22793
	Proc. Symp. Eng. Probl. Fusion Res., 15-19(1981)			8:22794
	Proc. Symp. Eng. Probl. Fusion Res., 20-22(1981)			8:22795
	Proc. Symp. Eng. Probl. Fusion Res., 23-25(1981)			8:22796
	Proc. Symp. Eng. Probl. Fusion Res., 27-29(1981)			8:22797
	Proc. Symp. Eng. Probl. Fusion Res., 30-33(1981)			8:22798
	Proc. Symp. Eng. Probl. Fusion Res., 34-36(1981)			8:22799
	Proc. Symp. Eng. Probl. Fusion Res., 37-38(1981)			8:22800
	Proc. Symp. Eng. Probl. Fusion Res., 39-42(1981)			8:22801

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	Proc. Symp. Eng. Probl. Fusion Res., 47-50(1981)			8:22802
	Proc. Symp. Eng. Probl. Fusion Res., 56-59(1981)			8:22803
	Proc. Symp. Eng. Probl. Fusion Res., 60-63(1981)			8:22804
	Proc. Symp. Eng. Probl. Fusion Res., 64-67(1981)			8:22805
	Proc. Symp. Eng. Probl. Fusion Res., 68-71(1981)			8:22806
	Proc. Symp. Eng. Probl. Fusion Res., 1138-1142(1981)			8:22807
	Proc. Symp. Eng. Probl. Fusion Res., 1158-1161(1981)			8:22808
	Proc. Symp. Eng. Probl. Fusion Res., 1162-1164(1981)			8:22809
	Proc. Symp. Eng. Probl. Fusion Res., 1184-1187(1981)			8:22810
	Proc. Symp. Eng. Probl. Fusion Res., 1188-1191(1981)			8:22811
	Proc. Symp. Eng. Probl. Fusion Res., 1298-1301(1981)			8:22812
	Proc. Symp. Eng. Probl. Fusion Res., 1302-1305(1981)			8:22813
	Proc. Symp. Eng. Probl. Fusion Res., 1368(1981)			8:22814
	Proc. Symp. Eng. Probl. Fusion Res., 1538-1541(1981)			8:22815
	Proc. Symp. Eng. Probl. Fusion Res., 1692(1981)			8:22816
	Proc. Symp. Eng. Probl. Fusion Res., 1693-1696(1981)			8:22817
	Proc. Symp. Eng. Probl. Fusion Res., 1697-1700(1981)			8:22818
	Proc. Symp. Eng. Probl. Fusion Res., 1701-1704(1981)			8:22819
	Proc. Symp. Eng. Probl. Fusion Res., 1794-1796(1981)			8:22820
190	NTIS, PC A02/MF A01; 1	DE83007756	MN -20a	8:22691
191	NTIS MF A01; 2	DE83007698	MN -20d	8:22692
192	NTIS, PC A02/MF A01; 1	DE83007858	MN -20	8:22597
193	NTIS, PC A02/MF A01; 1	DE83007701	MN -20a	8:22693
194	NTIS, PC A02/MF A01; 1	DE83007699	MN -20a	8:22598
195	NTIS, PC A02/MF A01; 1	DE83007700	MN -20a	8:22694
196	NTIS, PC A02/MF A01; 1	DE83007695	MN -20a	8:22695
197	NTIS, PC A02/MF A01; 1	DE83007790	MN -20d	8:22696
CONF-811046-	(Meeting and workshop on fusion reactor design and technology, Tokyo, Japan, 5-16 Oct 1981)			
19	NTIS, PC A03/MF A01; 1	DE83007643	MN -20d	8:22697
CONF-811088-	(American Ceramic Society conference, Newport Beach, CA, USA, 25-28 Oct 1981)			
7	NTIS, PC A02; 3	DE82022271	ND -70	8:19820
CONF-8110181-	(Conference on nuclear technology in developing countries: problems and prospects, Trieste, Italy, 12-16 Oct 1981)			
4	NTIS, PC A02/MF A01; 1	DE83007761	MN -34C	8:22368
CONF-8110242-	(International workshop on resonances in heavy ion collisions, Bad Honnef, F.R. Germany, 12-15 Oct 1981)			
2	NTIS, PC A02/MF A01; 1	DE83007762	MN -34D	8:22357
CONF-8110257-	(ORSA/TIMS joint national meeting, Houston, TX, USA, 11-14 Oct 1981)			
1	NTIS, PC A03/MF A01; 1	DE83007668	MN -25	8:20781
2	NTIS, PC A03/MF A01; 1	DE83007685	MN -98	8:20788
CONF-811145-	(International conference on neutron irradiation effects, Argonne, IL, USA, 9-12 Nov 1981)			
14	NTIS, PC A03/MF A01; 1	DE83007645	MN -25	8:21045
15	NTIS, PC A03/MF A01	DE83007776	MN -25	8:21046
16	NTIS, PC A02/MF A01	DE83007857	MN -25	8:22516
17	NTIS, PC A03/MF A01	DE83007856	MN -25	8:21047
CONF-811150-	(Yamada conference on point defects and defect interactions in metals, Kyoto, Japan, 16-20 Nov 1981)			
11	NTIS, PC A02/MF A01; 1	DE83007759	MN -25	8:22548
12	NTIS, PC A02/MF A01; 1	DE83007854	MN -25	8:21048
CONF-811160-	(US Department of Energy workshop on chemical characterization of hazardous substances in synfuels, Seattle, WA, USA, 4-6 Nov 1981)			
5	NTIS, PC A02/MF A01	DE83007681	MN -90a	8:21196
CONF-811174-	(2. convention of the international colloquium on drops and bubbles, Monterey, CA, USA, 19-21 Nov 1981)			
	See N-82-23466			8:21297
CONF-811195-	(Europhysics conference on the search for charm, beauty and truth at high energy, Erice, Italy, 15-22 Nov 1981)			
6	*See* FERMILAB-CONF-82/25-EXP	DE82012930	ND -34	8:22253
CONF-8111106-	(Specialists meeting on coal fired MHD power generation, Sydney, Australia, 4-6 Nov 1981)			
1	Ebasco Services, Inc., Newport Beach, CA		MN -90g	8:20874
CONF-8111130-	(Seminar of the KTG on chemistry and nuclear waste disposal, Juelich, F.R. Germany, 5 Nov 1981)			
	See Juel-Conf-43	DE83750180	MN -77	8:20394
CONF-8111140-	(4. international coal utilization conference, Houston, TX, USA, 17-19 Nov 1981)			
	Coal Technol. (Houston), 4: 157-177(1981)			8:19537
	Coal Technol. (Houston), 4: 329-352(1981)			8:19538
	Coal Technol. (Houston), 279-291(1981)			8:19539
	Coal Technol. (Houston), 293-307(1981)			8:19540
	Coal Technol. (Houston), 139-154(1981)			8:19625
	Coal Technol. (Houston), 251-265(1981)			8:19644
	Coal Technol. (Houston), 53-67(1981)			8:19645
	Coal Technol. (Houston), 29-51(1981)			8:19684
CONF-811215-	(World conference on neutron radiography, San Diego, CA, USA, 7-10 Dec 1981)			
13	NTIS, PC A02/MF A01	DE83007933	MN -79p	8:20635
CONF-811261-	(Parabolic dish solar thermal power annual program review, Atlanta, GA, USA, 8-10 Dec 1981)			
	See DOE/JPL-1060-52	DE83000474	STD -62b	8:20056

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CONF-811274-	(Institute of Plasma Physics conference, Nogoya, Japan, 14-18 Dec 1981)			
1	NTIS, PC A02/MF A01; 1	DE83007758	MN -20a	8:22698
CONF-811275-	(Allied Social Science Association annual meeting, Washington, DC, USA, 28-30 Dec 1981)			
1	NTIS, PC A02/MF A01	DE83007824	MN -98	8:20770
CONF-820128-	(61. annual meeting of the Transportation Research Board, Washington, DC, USA, 18-22 Jan 1982)			
4	NTIS, PC A02/MF A01; 1	DE83007606	MN -96	8:20945
5	NTIS, PC A03/MF A01; 1	DE83007604	MN -96	8:20946
6	NTIS, PC A03/MF A01; 1	DE83007630	MN -80	8:20947
CONF-820165-	(Pan American symposium on HEP and technology, Cocoyoc, Mexico, 4-8 Jan 1982)			
1	*See* FERMILAB-CONF-82/36-THY	DE83006478	MN -28	8:22246
CONF-820210-	(NEPCON '82 WEST, Anaheim, CA, USA, 23-25 Feb 1982)			
3	*See* UCRL-88552	DE83007362	MN -20g	8:22749
CONF-820217-	(9. energy technology conference, Washington, DC, USA, 16-18 Feb 1982)			
9	NTIS, PC A02/MF A01	DE83007512	MN -11	8:19983
CONF-820274-	(2. national symposium on positron annihilation, Madras, India, 8-12 Feb 1982)			
1	NTIS, PC A03/MF A01; 1	DE83007638	MN -25	8:21049
CONF-820275-	(Workshop on effects of air pollution on farm commodities, Washington, DC, USA, 17 Feb 1982)			
2	NTIS, PC A02/MF A01	DE83007637	MN -11	8:21989
CONF-820303-	(Waste management conference, Tucson, AZ, USA, 8-11 Mar 1982)			
43	*See* HEDL-SA-2615	DE82016161	ND -70	8:19831
CONF-820322-	(Federal information processing standards software documentation workshop, Washington, DC, USA, 3 Mar 1982)			
3	NTIS, PC A02/MF A01	DE83007570	MN -32	8:22872
CONF-820325-	(International symposium on the electronic structure and properties of hydrogen in metals, Richmond, VA, USA, 4-6 Mar 1982)			
13	NTIS, PC A02/MF A01; 1	DE83007958	MN -4	8:21119
CONF-820336-	(Optical Society of America topical meeting on laser techniques for extreme ultraviolet spectroscopy, Boulder, CO, USA, 8-10 Mar 1982)			
9	NTIS, PC A02/MF A01; 1	DE83007621	MN -38	8:21386
CONF-820360-	(IAEA specialists meeting on water reactor fuel element performance computer modelling, Preston, UK, 14-19 Mar 1982)			
3	NTIS, PC A02; 3	DE83007631	ND -78	8:20611
CONF-8203115-	(13. lunar and planetary conference, Houston, TX, USA, 15-19 Mar 1982)			
1	NTIS, PC A03/MF A01; 1	DE83007816	MN -4	8:21197
CONF-820406-	(Topical meeting on fast, thermal and fusion reactor experiments, Salt Lake City, UT, USA, 12-15 Apr 1982)			
24	NTIS, PC A02/MF A01	DE83007732	MN -79p	8:20678
25	NTIS, PC A02/MF A01	DE83007825	MN -79m	8:20636
26	NTIS, PC A02/MF A01; 1	DE83007807	MN -80	8:20637
CONF-820410-	(ASME solar energy conference, Albuquerque, NM, USA, 26-30 Apr 1982)			
10	*See* CEA-CONF-6248	DE83901343	MN -62	8:20054
CONF-820434-	(6. international conference on positron annihilation, Arlington, TX, USA, 3-7 Apr 1982)			
15	NTIS, PC A02/MF A01; 1	DE83007819	MN -25	8:21050
16	NTIS, PC A02/MF A01; 1	DE83007717	MN -25	8:21051
CONF-820449-	(63. annual meeting of the American Welding Society, Kansas City, MO, USA, 26-30 Apr 1982)			
	Weld. J. (Miami), 61: 334.S-338.S(Oct 1982)			8:21107
CONF-820451-	(DOE radiation epidemiology contractors workshop, Rockville, MD, USA, 13-14 Apr 1982)			
2	NTIS, PC A03/MF A01	DE83007799	MN -41	8:21945
CONF-820465-	(American Power conference on nuclear regulation-future directions, Chicago, IL, USA, 26-28 Apr 1982)			
2	NTIS, PC A02/MF A01	DE83007671	MN -79	8:20418
CONF-820473-	(Symposium on wave particle dualism, Perugia, Italy, 22-30 Apr 1982)			
2	*See* SLAC-PUB-2997	DE83007014	MN -34C	8:22162
CONF-8204106-	(5. Federal Emergency Management Agency conference on fire and the related effects of nuclear explosions, Asilomar, CA, USA, 25-29 Apr 1982)			
Summ.	*See* UCRL-15508	DE83006568	MN -35	8:21670
CONF-8204111-	(Workshop on hygroscopic aerosols in the planetary boundary layer, Vail, CO, USA, 13-15 Apr 1982)			
1	NTIS, PC A02/MF A01	DE83007672	MN -11	8:21697
CONF-8204112-	(4. annual industrial energy conservation technology conference, Houston, TX, USA, 6 Apr 1982)			
1	NTIS MF A01; 2	DE83007716	MN -80	8:20965
CONF-8204113-	(Conference on electron beam interactions and solids for microscopy, microanalysis and microlithography, Asilomar, CA, USA, 18-23 Apr 1982)			
1	NTIS. PC A04/MF A01; 1	DE83007185	MN -34C	8:22183

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CONF-820506-	(International conference on geothermal energy, Florence, Italy, 11-14 May 1982)			
3	*See* SAND-81-1795C	DE82006298	ND -66	**8:20182**
CONF-820508-	(Spring meeting of the Electrochemical Society, Montreal, Canada, 9-14 May 1982)			
7	NTIS, PC A03/MF A01	DE83009382	MN -93	**8:20885**
CONF-820510-	(Spring meeting for the Society for the Advancement of Materials and Process Engineering, San Diego, CA, USA, 4-6 May 1982)			
6	NTIS, PC A02/MF A01; 1	DE83007595	MN -78	**8:20325**
CONF-820545-	(5. international conference on plasma surface, Gatlinburg, TN, USA, 3-5 May 1982)			
22	NTIS, PC A02/MF A01	DE83007683	MN -20a	**8:22699**
CONF-820547-	(84. annual meeting of the American Ceramic Society, Cincinnati, OH, USA, 2-5 May 1982)			
16	NTIS, PC A03/MF A01; 1	DE83007731	MN -25	**8:21035**
CONF-820552-	(International symposium on management of waste from uranium mining and milling, Albuquerque, NM, USA, 10-14 May 1982)			
	See STI/PUB-622		ND -70A	**8:19869**
CONF-820566-	(Thermal reactor benchmark calculations, techniques, results and applications seminar, Upton, NY, USA, 17-18 May 1982)			
8	NTIS, PC A02/MF A01; 1	DE83007680	MN -79p	**8:20679**
CONF-8205103-	(Workshop on physics at LEAR with low energy cooled antiprotons, Erice, Italy, 9-16 May 1982)			
4	*See* BNL-32460	DE83006303	MN -34C	**8:22367**
CONF-8205110-	(Desorption induced by electronic transitions conference, Williamsburg, VA, USA, 12-14 May 1982)			
3	NTIS, PC A02/MF A01	DE83007596	MN -4	**8:22184**
CONF-8205131-	(3. international conference on vibrations in nuclear plants, Keswick, UK, 11-14 May 1982)			
2	*See* GKSS-82/E/23	DE83750183	MN -78	**8:20693**
CONF-8205151-	(4. international conference on numerical methods in geomechanics, Edmonton, Canada, 31 May-4 Jun 1982)			
1	*See* UCRL-86266	DE83006411	MN -11	**8:21685**
CONF-8205153-	(IEA/AFBC technical meeting, Petten, Netherlands, 1 May 1982)			
1	TNO, P.O. Box 217, Delft, Netherlands			**8:19643**
CONF-8205156-	(EPRI workshop on support-structure corrosion in steam generators, Boston, MA, USA, 18-19 May 1982)			
	See EPRI-NP-2791	DE83901574	MN -78	**8:20356**
CONF-8205157-	(American Geophysical Union spring meeting, Philadelphia, PA, USA, 31 May-4 Jun 1982)			
1	*See* LBL-14086	DE83006956	MN -11	**8:19853**
CONF-8205161-	(International symposium on the economic aspects of coal pollution abatement technologies, Petten, Netherlands, 24-28 May 1982)			
1	NTIS, PC A02/MF A01; 1	DE83007679	MN -90i	**8:19576**
CONF-8205162-	(Conference on mononuclear phagocyte biology, Wilmington, NC, USA, 17 May 1982)			
1	*See* LA-UR-83-420	DE83007559	MN -48	**8:21904**
CONF-820601-	(ASME pressure vessel and piping conference, Orlando, FL, USA, 27 Jun-1 Jul 1982)			
24	NTIS, PC A03/MF A01; 1	DE83007625	MN -80	**8:20680**
CONF-820609-	(American Nuclear Society annual meeting, Los Angeles, CA, USA, 6-11 Jun 1982)			
	Trans. Am. Nucl. Soc., 41: 283(Jun 1982)			**8:19870**
	Trans. Am. Nucl. Soc., 41: 284-285(Jun 1982)			**8:19871**
	Trans. Am. Nucl. Soc., 41: 285(Jun 1982)			**8:19872**
	Trans. Am. Nucl. Soc., 41: 671-672(Jun 1982)			**8:20349**
	Trans. Am. Nucl. Soc., 41: 550-551(Jun 1982)			**8:20387**
	Trans. Am. Nucl. Soc., 41: 296-297(Jun 1982)			**8:20388**
	Trans. Am. Nucl. Soc., 41: 297-298(Jun 1982)			**8:20389**
	Trans. Am. Nucl. Soc., 41: 640-641(Jun 1982)			**8:20441**
	Trans. Am. Nucl. Soc., 41: 578-579(Jun 1982)			**8:20442**
	Trans. Am. Nucl. Soc., 41: 136-137(Jun 1982)			**8:20443**
	Trans. Am. Nucl. Soc., 41: 299-300(Jun 1982)			**8:20444**
	Trans. Am. Nucl. Soc., 41: 496-497(Jun 1982)			**8:20559**
	Trans. Am. Nucl. Soc., 41: 619-620(Jun 1982)			**8:20560**
	Trans. Am. Nucl. Soc., 41: 352(Jun 1982)			**8:20561**
	Trans. Am. Nucl. Soc., 41: 292-294(Jun 1982)			**8:20616**
	Trans. Am. Nucl. Soc., 41: 300-301(Jun 1982)			**8:20649**
	Trans. Am. Nucl. Soc., 41: 301(Jun 1982)			**8:20731**
	Trans. Am. Nucl. Soc., 41: 422(Jun 1982)			**8:20732**
	Trans. Am. Nucl. Soc., 41: 350-351(Jun 1982)			**8:21360**
	Trans. Am. Nucl. Soc., 41: 354(Jun 1982)			**8:21361**
	Trans. Am. Nucl. Soc., 41: 333-334(Jun 1982)			**8:21362**
	Trans. Am. Nucl. Soc., 41: 335-336(Jun 1982)			**8:21363**
	Trans. Am. Nucl. Soc., 41: 336-337(Jun 1982)			**8:21364**
	Trans. Am. Nucl. Soc., 41: 342-343(Jun 1982)			**8:21365**
	Trans. Am. Nucl. Soc., 41: 343-345(Jun 1982)			**8:21366**
	Trans. Am. Nucl. Soc., 41: 471-472(Jun 1982)			**8:21671**
	Trans. Am. Nucl. Soc., 41: 470-471(Jun 1982)			**8:21672**
	Trans. Am. Nucl. Soc., 41: 485-486(Jun 1982)			**8:21921**
	Trans. Am. Nucl. Soc., 41: 494-495(Jun 1982)			**8:22528**

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	Trans. Am. Nucl. Soc., 41: 493(Jun 1982)			8:22529
	Trans. Am. Nucl. Soc., 41: 480-481(Jun 1982)			8:22530
	Trans. Am. Nucl. Soc., 41: 319(Jun 1982)			8:22662
CONF-820611-	(American Electroplaters Society (SUR/FIN) conference, San Francisco, CA, USA, 20-24 Jun 1982)			
3	*See* RFP-3329	DE83006740	MN -38	8:21084
4	*See* K/ET-5033	DE83007492	MN -4	8:21214
CONF-820614-	(9. US national congress of applied mechanics, Ithace, NY, USA, 21-25 Jun 1982)			
6	NTIS, PC A02/MF A01; 1	DE83007615	MN -38	8:21421
CONF-820619-	(9. annual engineering conference on reliability, Hershey, PA, USA, 16-18 Jun 1982)			
2	NTIS, PC A02/MF A01	DE83007613	MN -2	8:20449
CONF-820627-	(75. annual meeting on the Air Pollution Control Association, New Orleans, LA, USA, 20-25 Jun 1982)			
12	NTIS, PC A02/MF A01; 1	DE83007632	MN -11	8:21691
13	NTIS, PC A02/MF A01; 1	DE83007609	MN -95d	8:20996
CONF-820628-	(11. international symposium on effects of radiation on materials, American Society for Testing and Materials, Scottsdale, AZ, USA, 28-30 Jun 1982)			
21	NTIS, PC A02/MF A01; 1	DE83007741	MN -79h	8:20419
CONF-820645-	(20. symposium on engineering aspects of magnetohydrodynamics, Los Angeles, CA, USA, 14-16 Jun 1982)			
5	NTIS, PC A02/MF A01; 1	DE83007622	MN -90g	8:20871
6	NTIS, PC A02/MF A01; 1	DE83007597	MN -90g	8:20872
7	NTIS, PC A02/MF A01; 1	DE83007619	MN -80	8:20873
CONF-820649-	(National Computer Graphics Association conference, Anaheim, CA, USA, 13-17 Jun 1982)			
3	NTIS, PC A02/MF A01; 1	DE83007957	MN -80	8:20638
CONF-820659-	(4. conference on superconductivity in d- and f-band metals, Karlsruhe, F.R. Germany, 28-30 Jun 1982)			
7	NTIS, PC A02/MF A01; 1	DE83007747	MN -34	8:21052
CONF-820662-	(6. international conference on zirconium in the nuclear industry, Vancouver, BC, Canada, 28 Jun-1 Jul 1982)			
5	NTIS, PC A03/MF A01; 1	DE83007936	MN -25	8:21053
CONF-820667-	(5. international workshop on HgI/sub 2/ nuclear radiation detectors, Jerusalem, Israel, 6-8 Jun 1982)			
8	NTIS, PC A02/MF A01	DE83006571	MN -37	8:21570
CONF-820668-	(9. DOE workshop on personnel neutron dosimetry, Las Vegas, NV, USA, 24-25 Jun 1982)			
	See PNL-SA-10714	DE83006605	MN -41	8:22543
CONF-820676-	(SERI biomass program principal investigators review meeting, Washington, DC, USA, 23-25 Jun 1982)			
	See SERI/CP-231-1873	DE83005811	MN -61	8:19919
Vol.2	*See* SERI/CP-230-1797	DE83005106	MN -61a	8:19937
CONF-8206116-	(DPF summer study on elementary particle physics and future facilities, Aspen, CO, USA, 28 Jun-16 Jul 1982)			
21	*See* SLAC-PUB-3004	DE83007015	MN -28	8:21479
CONF-8206117-	(13. international symposium on multiparticle dynamics, Volendam, Netherlands, 6-11 Jun 1982)			
4	*See* SLAC-PUB-2966	DE83007007	MN -34D	8:22320
CONF-8206118-	(6. annual international collaboration of advanced neutron sources meeting, Argonne, IL, USA, 28 Jun-2 Jul 1982)			
8	NTIS, PC A02/MF A01; 1	DE83007748	MN -34A	8:21514
9	NTIS, PC A02/MF A01; 1	DE83007610	MN -34D	8:21515
10	NTIS, PC A02/MF A01	DE83007611	MN -34D	8:21571
CONF-8206132-	(Nuclear reaction mechanism conference, Varenna, Italy, 14-19 Jun 1982)			
2	NTIS, PC A02/MF A01; 1	DE83007614	MN -34D	8:22383
CONF-8206141-	(2. annual advanced gasification projects contractors' meeting, Morgantown, WV, USA, 22-24 Jun 1982)			
	See DOE/METC-82-51	DE83004848	STD -90c	8:19435
CONF-8206156-	(Nuffield workshop on the very early universe, Cambridge, UK, 21 Jun-9 Jul 1982)			
1	*See* SLAC-PUB-3006	DE83007018	MN -34D	8:22321
CONF-8206158-	(Coordination of physical, chemical, and thermodynamic properties for coal conversion conference, Oak Ridge, TN, USA, 2-4 Jun 1982)			
Summ.	*See* ORNL/TM-8541	DE83007169	STD -90d	8:19568
CONF-8206159-	(NATO Advanced Study Institute conference on the impact of cluster physics in materials, Cap d'Agde, France, 13-25 Jun 1982)			
1	NTIS, PC A02/MF A01	DE83007618	MN -34A	8:22185
CONF-8206160-	(2. international conference on transport in non-stoichiometric compounds, Perpignan, France, 28-2 Jun 1982)			
1	NTIS, PC A03/MF A01	DE83007617	MN -25	8:21121
CONF-8206161-	(IAEA symposium on radioimmunoassay and related procedures in medicine, Vienna, Austria, 21-25 Jun 1982)			
	See STI/PUB-625		ND -48	8:21919
CONF-8206163-	(11. international radiocarbon conference, Seattle, WA, USA, 20-26 Jun 1982)			
1	NTIS, PC A03/MF A01; 1	DE83007863	MN -34D	8:21516
CONF-820709-	(SLAC summer institute on particle physics, Stanford, CA, USA, 17 Jul-7 Aug 1982)			
3	*See* SLAC-PUB-3015	DE83007062	MN -34D	8:22303

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CONF-820717-	(PAHR information exchange conference, Karlsruhe, F.R. Germany, 28-30 Jul 1982)			
	Sheridan House Inc., 175 Orawaupum Street, White Plains, NY 10606, $30.00			8:20730
CONF-820718-	(21. international conference on high energy physics, Paris, France, 29 Jul-8 Aug 1982)			
27	*See* SLAC-PUB-3005	DE83007012	MN -34D	8:22275
29	*See* SLAC-PUB-2988	DE83007011	MN -34D	8:22272
30	*See* SLAC-PUB-2981	DE83007005	MN -34	8:22270
31	*See* SLAC-PUB-2954	DE83007016	MN -28	8:21478
CONF-820731-	(North Atlantic Treaty Organization Advanced Study Institute conference on atomic and molecular processes in controlled thermonuclear research, Palermo, Italy, 19-30 Jul 1982)			
2	*See* LBL-15483	DE83006966	MN -20a	8:22740
3	*See* UCRL-88511	DE83007360	MN -21	8:22748
CONF-820745-	(2. LAMPF workshop, Los Alamos, NM, USA, 19-22 Jul 1982)			
Vol.1	*See* LA-9572-C-Vol.1	DE83005000	STD -34	8:21519
Vol.2	*See* LA-9572-C-Vol.2	DE83005001	STD -34	8:21524
CONF-820802-	(International meeting on thermal nuclear reactor safety, Chicago, IL, USA, 29 Aug-2 Sep 1982)			
53	NTIS, PC A02/MF A01	DE83007714	MN -80	8:20681
CONF-820810-	(10. international mathematics and computers simulation congress on systems simulation and scientific computation, Montreal, Canada, 9-13 Aug 1982)			
15	NTIS, PC A02/MF A01; 1	DE83007633	MN -78	8:20682
16	NTIS, PC A02/MF A01	DE83008681	MN -11	8:21679
CONF-820814-	(17. Intersociety Energy Conversion Engineering conference, Los Angeles, CA, USA, 8-13 Aug 1982)			
41	NTIS, PC A02/MF A01; 1	DE83008670	MN -64	8:20071
CONF-820825-	(SHARE 59 meeting, New Orleans, LA, USA, 22-27 Aug 1982)			
2	NTIS, PC A03/MF A01	DE83007962	MN -32	8:22873
CONF-820828-	(9. EPS Nuclear Physics Divisional conference on nuclear structure, Amsterdam, Netherlands, 29 Aug-4 Sep 1982)			
8	NTIS, PC A02/MF A01; 1	DE83007945	MN -34C	8:22351
CONF-820838-	(Future engineering development needs for magnetic fusion workshop, Washington, DC, USA, 3-4 Aug 1982)			
3	NTIS, PC A03/MF A01; 1	DE83007569	MN -20d	8:22700
CONF-820843-	(US-Japan seminar on new models and constitutive relations in the mechanics of granular materials, Ithaca, NY, USA, 22-27 Aug 1982)			
3	*See* UCRL-88560	DE83005446	MN -25	8:22234
CONF-820853-	(NATO conference on photophysics and photochemistry in the vacuum ultraviolet, Lake Geneva, WI, USA, 15-29 Aug 1982)			
4	NTIS, PC A04/MF A01	DE83007864	MN -4	8:22181
CONF-820876-	(Workshop on nuclear power plant aging, Bethesda, MD, USA, 4-5 Aug 1982)			
	See NUREG/CP-0036	DE83003875	MN -80	8:20574
CONF-820896-	(Nordic meeting on nuclear physics, Fugiso, Denmark, 16-20 Aug 1982)			
5	NTIS, PC A02/MF A01; 1	DE83007861	MN -34C	8:22374
6	NTIS, PC A02/MF A01	DE83007800	MN -34C	8:22356
CONF-820897-	(Conference on physics at very high energy, Stanford, CA, USA, 16-27 Aug 1982)			
1	*See* LBL-15469	DE83006968	MN -28	8:22268
2	*See* SLAC-PUB-2982	DE83007004	MN -34D	8:22271
3	*See* SLAC-PUB-3001	DE83007013	MN -34D	8:22274
CONF-8208103-	(4. European symposium on anti NN and anti QQ interactions, Santiago de Compostella, Spain, 30 Aug-3 Sep 1982)			
2	*See* SLAC-PUB-2989	DE83007063	MN -34D	8:22273
CONF-8208113-	(International symposium on process systems engineering, Kyoto, Japan, 1 Aug 1982)			
1	*See* DOE/ER/10645-7	DE83007322	MN -4	8:19685
CONF-8208114-	(2. national conference on renewable energy technologies, San Juan, Puerto Rico, 1-7 Aug 1982)			
1	NTIS, PC A02/MF A01	DE83007568	MN -61a	8:19985
CONF-8208117-	(Conference on generation planning: modeling and decision-making, Chattanooga, TN, USA, 10-12 Aug 1982)			
1	NTIS, PC A02/MF A01; 1	DE83007737	MN -80	8:20477
CONF-8208118-	(Diffusion in metals and alloys conference, Tihany, Hungary, 29 Aug-3 Sep 1982)			
1	NTIS, PC A02/MF A01	DE83007785	MN -25	8:21064
CONF-820901-	(7. international heat transfer conference, Munich, F.R. Germany, 6-10 Sep 1982)			
7	NTIS, PC A02/MF A01; 1	DE83007703	MN -80	8:20683
8	NTIS, PC A02/MF A01; 1	DE83007705	MN -80	8:20684
CONF-820909-	(National meeting of the American Chemical Society, Kansas City, MO, USA, 1 Sep 1982)			
18	*See* SERI/TP-232-1733	DE83007317	MN -61a	8:20023
CONF-820925-	(NRC meeting on advances in reactor physics and core thermal hydraulics, Kiamesha Lake, NY, USA, 22-24 Sep 1982)			
Vol.1	*See* NUREG/CP-0034-Vol.1	DE82906283	MN -80	8:20554

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CONF-820929-	(IUPAP international conference on magnetism, Kyoto, Japan, 6-10 Sep 1982)			
10	NTIS, PC A02/MF A01; 1	DE83007765	MN -34	8:21054
11	NTIS, PC A02/MF A01; 1	DE83007814	MN -34C	8:21120
CONF-820935-	(6. Yamada conference on neutron scattering of condensed matter, Tokyo, Japan, 1 Sep 1982)			
8	NTIS, PC A02/MF A01; 1	DE83007736	MN -34C	8:21504
CONF-820941-	(5. international symposium on high energy spin physics, Upton, NY, USA, 16-22 Sep 1982)			
12	*See* FERMILAB-CONF-82/65-THY	DE83006645	MN -34D	8:21491
13	*See* DOE/ER/40010-964	DE83007325	MN -34D	8:22192
14	*See* SLAC-PUB-3017	DE83007025	MN -34D	8:22276
CONF-820944-	(Workshop on diagnostics for fusion reactor conditions, Varenna, Italy, 6-17 Sep 1982)			
7	*See* GA-A-16818	DE83007186	MN -20f	8:22726
CONF-820966-	(3. world filtration congress, Downington, PA, USA, 13-17 Sep 1982)			
2	NTIS, PC A02/MF A01	DE83007711	MN -90e	8:20245
CONF-820970-	(Carbon dioxide research conference: carbon dioxide, science and consensus, Berkeley Springs, WV, USA, 19-23 Sep 1982)			
	NTIS, PC A23/MF A01; 1	DE83007182	STD -11	8:21692
CONF-820980-	(European Committee of future accelerators - the challenge of ultra-high energies conference, Oxford, UK, 27-30 Sep 1982)			
4	*See* FERMILAB-CONF-82/77-THY	DE83006643	MN -28	8:21474
5	*See* BNL-32531	DE83007389	MN -28	8:21472
CONF-820983-	(Europhysics study conference on jet structure from quark and lepton interactions, Erice-Trapani-Sicily, Italy, 12-17 Sep 1982)			
3	*See* DOE/ER/40008-29	DE83006482	MN -34D	8:22283
CONF-820985-	(8. European conference on thermophysical properties - high temperatures high pressure, Baden-Baden, F.R. Germany, 27 Sep-1 Oct 1982)			
3	NTIS, PC A02/MF A01; 1	DE83007722	MN -80	8:20685
CONF-820988-	(Free electron laser conference, Bendor, France, 26 Sep-1 Oct 1982)			
6	*See* SLAC-PUB-3022	DE83007060	MN -28	8:21560
7	*See* LA-UR-83-330	DE83007545	MN -34	8:21388
CONF-820989-	(Workshop on science underground, Los Alamos, NM, USA, 27 Sep-1 Oct 1982)			
5	*See* LA-UR-83-333	DE83007546	MN -34	8:22562
CONF-820997-	(Workshop on beam cooling, Stoughton, WI, USA, 9-11 Sep 1982)			
2	*See* LBL-15238	DE83007043	MN -37	8:21528
CONF-820999-	(California business: realities/prospects conference, Berkeley, CA, USA, 13-14 Sep 1982)			
1	*See* UCRL-88221	DE83006582	MN -96	8:21030
CONF-8209100-	(Europhysics study conference on multibody phenomena in strong, electromagnetic, and weak interactions, Erice, Italy, 11-18 Sep 1982)			
1	*See* FERMILAB-CONF-82/91-THY	DE83006644	MN -34D	8:22284
CONF-8209101-	(Inelastic ion, surface collision conference, Middlefart, Denmark, 21-24 Sep 1982)			
1	*See* SAND-82-3002C	DE83007367	MN -4	8:21273
2	NTIS, PC A04/MF A01; 1	DE83007657	MN -34C	8:22186
CONF-8209103-	(IUPAC conference on thermodynamics, London, UK, 7-10 Sep 1982)			
1	NTIS, PC A02/MF A01	DE83007677	MN -4	8:21292
CONF-8209104-	(Annual meeting of the American Sociological Association, San Francisco, CA, USA, 6 Sep 1982)			
1	NTIS, PC A03/MF A01; 1	DE83007961	MN -91	8:21885
CONF-8209107-	(Workshop on algorithmically-specialized computer organizations, West Lafayette, IN, USA, 27 Sep-1 Oct 1982)			
1	*See* LA-UR-83-413	DE83007558	MN -32	8:22623
CONF-8209108-	(2. conference on calorimetry, Prague, Czechoslovakia, 13-17 Sep 1982)			
1	NTIS, PC A02/MF A01	DE83007704	MN -66a	8:20194
CONF-821011-	(IEEE nuclear science symposium, Washington, DC, USA, 20-22 Oct 1982)			
46	*See* SLAC-PUB-2994	DE83007008	MN -32	8:21608
47	*See* SLAC-PUB-2991	DE83007009	MN -32	8:21607
48	*See* SLAC-PUB-2990	DE83007010	MN -32	8:21606
CONF-821012-	(Institue for Management Sciences/Operations Research Society of America joint meeting, San Diego, CA, USA, 25-27 Oct 1982)			
5	NTIS, PC A02/MF A01	DE83007744	MN -61a	8:19984
CONF-821049-	(TMS/AIME fall meeting, St. Louis, MO, USA, 24-28 Oct 1982)			
13	NTIS, PC A03/MF A01	DE83007682	MN -20c	8:21055
14	NTIS, PC A02/MF A01	DE83007743	MN -25	8:21056
15	NTIS, PC A03/MF A01	DE83007822	MN -25	8:21057
16	NTIS, PC A03/MF A01	DE83007763	MN -20c	8:21058

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CONF-821057-	(International conference on the impact of polarized neutrons on solid state chemistry and physics, Grenoble, France, 15-19 Oct 1982)			
2	NTIS, PC A02/MF A01; 1	DE83007827	MN -34	8:21059
CONF-821071-	(70. annual national safety congress and exposition, Chicago, IL, USA, 19 Oct 1982)			
2	NTIS, PC A03/MF A01; 1	DE83007826	MN -11	8:21990
CONF-821089-	(6. international workshop on laser interaction and related plasma phenomena, Monterey, CA, USA, 25-29 Oct 1982)			
7	*See* NRL-MR-5003	DE83007231	MN -21	8:22741
CONF-821094-	(International conference on fouling of heat exchangers, White Haven, PA, USA, 31 Oct-5 Nov 1982)			
2	NTIS, PC A02/MF A01		MN -90	8:19421
CONF-8210100-	(7. international symposium on polynuclear aromatic hydrocarbons, Columbus, OH, USA, 26-28 Oct 1982)			
2	*See* PNL-SA-10869	DE83006939	MN -90d	8:19667
CONF-8210106-	(Workshop on uses of nuclear analytical methods in metal toxicology, Upton, NY, USA, 11-12 Oct 1982)			
3	*See* BNL-32266	DE83007388	MN -48	8:21896
CONF-8210107-	(Workshop on Drell-Yan processes, Batavia, IL, USA, 7-8 Oct 1982)			
2	*See* FERMILAB-Conf-83/13-EXP	DE83007136	MN -34D	8:22254
CONF-8210116-	(American Society of Metals meeting, St. Louis, MO, USA, 24-28 Oct 1982)			
2	NTIS, PC A03/MF A01; 1	DE83007745	MN -25	8:21065
CONF-8210118-	(Interagency mechanical operations group meeting, Albuquerque, NM, USA, 27 Oct 1982)			
1	*See* UCRL-88340	DE83006581	MN -38	8:21357
CONF-8210123-	(Magnetic monopole workshop, Racine, WI, USA, 14-17 Oct 1982)			
1	*See* SLAC-PUB-3003	DE83007061	MN -34D	8:22302
CONF-8210124-	(DOE/ALO interagency mechanical operations group meeting, Las Vegas, NV, USA, 19-21 Oct 1982)			
1	*See* Y/DV-265	DE83007283	MN -38	8:21091
CONF-8210126-	(55. annual conference on water pollution control, St. Louis, MO, USA, 3-8 Oct 1982)			
1	Inst. of Gas Tech., 3424 South State Street, IIT Center, Chicago, IL 60616		MN -61a	8:20998
CONF-8210127-	(Executive coal gas conference - EUROPE 82, Amsterdam, Netherlands, 19-21 Oct 1982)			
1	NTIS, PC A02/MF A01; 1	DE83007157	MN -90c	8:19424
CONF-8210128-	(Current trends in atomic spectroscopy workshop, Tucson, AZ, USA, 24-26 Oct 1982)			
1	NTIS, PC A02/MF A01	DE83007821	MN -34	8:22187
CONF-8210129-	(Colloquium on perspective biology, Nancy, France, 3-4 Oct 1982)			
1	NTIS, PC A02/MF A01	DE83007662	MN -48	8:21897
CONF-821101-	(ASME winter annual meeting, Phoenix, AZ, USA, 14-19 Nov 1982)			
20	Univ. of Tennessee, Mechanical and Aerospace Engineering Dept., Knoxville		MN -59c	8:20085
CONF-821103-	(American Nuclear Society winter meeting, Washington, DC, USA, 14-19 Nov 1982)			
84	NTIS, PC A02/MF A01	DE83007257	MN -79e	8:20420
85	*See* ARSD-SP-029	DE83005223	MN -79p	8:20416
CONF-821104-	(2. international conference on nuclear technology transfer, Buenos Aires, Argentina, 1-5 Nov 1982)			
3	NTIS, PC A02/MF A01	DE83007729	MN -80	8:20639
CONF-821106-	(Annual meeting of heat transfer and energy conversion, Los Angeles, CA, USA, 14-18 Nov 1982)			
15	NTIS, PC A03/MF A01	DE83003483	MN -90d	8:19544
25	Institute of Gas Technoloy, 3424 South State Street, Chicago, IL 60616		MN -80	8:21190
26	Institute of Gas Technology, 3424 South State Street - IIT Center, Chicago, IL 60616		MN -4	8:21229
27	*See* DOE/ER/10645-9	DE83007320	MN -4	8:21191
28	NTIS, PC A03/MF A01; 1	DE83007730	MN -94cc	8:20744
CONF-821107-	(6. international symposium on the scientific basis for radioactive waste management, Boston, MA, USA, 1-4 Nov 1982)			
48	*See* BNL-32407	DE83005673	MN -25	8:21040
50	NTIS, PC A02; 3	DE83007862	ND -70	8:21156
51	*See* LBL-15489	DE83008394	MN -34	8:21075
CONF-821108-	(Applied superconductivity conference, Knoxville, TN, USA, 30 Nov-3 Dec 1982)			
21	*See* LBL-15372	DE83006954	MN -20b	8:21341
22	*See* BNL-32559	DE83007386	MN -28	8:21500
23	*See* LBL-14390	DE83007065	MN -28	8:21339
24	*See* LBL-14445	DE83007021	MN -28	8:21340
25	NTIS, PC A02/MF A01; 1	DE83007728	MN -20	8:22701
CONF-821119-	(International symposium on recent advances in nuclear materials safeguards, Nienna, Australia, 8-12 Nov 1982)			
12	NTIS, PC A02; 3	DE83007734	ND -79c	8:20421
13	NTIS, PC A02/MF A01; 1	DE83007746	MN -15	8:19895

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CONF-821121-	(1. US/China conference on energy, resources and environment, Beijing, China, 7-12 Nov 1982)			
3	*See* LBL-15183	DE83008253	MN -95d	8:20906
CONF-821123-	(7. conference on the application of accelerators in research and industry, Denton, TX, USA, 8-10 Nov 1982)			
36	*See* BNL-32344	DE83005791	ND -28	8:21499
37	*See* DOE/ER/40010-963	DE83007298	MN -34A	8:21517
CONF-821136-	(4. international conference on precipitation scavenging, dry deposition and resuspension, Santa Monica, CA, USA, 29 Nov-3 Dec 1982)			
19	*See* PNL-SA-10480	DE83007076	MN -11	8:21775
20	*See* PNL-SA-10481	DE83007082	MN -11	8:21776
CONF-821143-	(High angular momentum properties of nuclei conference, Oak Ridge, TN, USA, 2-4 Nov 1982)			
4	NTIS, PC A03; 3	DE83007788	ND -34C	8:22375
CONF-821145-	(7. materials for coal conversion and utilization conference, Gaithersburg, MD, USA, 16-18 Nov 1982)			
4	NTIS, PC A03/MF A01; 1	DE83007735	MN -90c	8:19422
CONF-821155-	(International meeting on research and test reactor core conversions from HEU to LEU fuels, Argonne, IL, USA, 8-10 Nov 1982)			
2	NTIS, PC A03/MF A01; 1	DE83007766	MN -80	8:20640
3	NTIS, PC A02/MF A01; 1	DE83007727	MN -80	8:20641
4	NTIS, PC A03/MF A01	DE83007725	MN -80	8:20642
5	NTIS, PC A03/MF A01	DE83007726	MN -80	8:20643
6	NTIS, PC A02/MF A01; 1	DE83007724	MN -80	8:20644
CONF-821159-	(5. solar wind conference, Woodstock, VT, USA, 1-5 Nov 1982)			
4	*See* LA-UR-83-348	DE83007547	MN -34B	8:22078
CONF-821160-	(International workshop on bismuth germanate, Princeton, NJ, USA, 10 Nov 1982)			
2	*See* LA-UR-83-424	DE83007560	MN -34B	8:21580
CONF-821166-	(Monte Carlo methods in quantum problems conference, Paris, France, 29 Nov-3 Dec 1982)			
1	*See* UCRL-88642	DE83006570	MN -34A	8:22565
CONF-821167-	(European seminar on the risks from tritium exposure, Mole, Belgium, 22-24 Nov 1982)			
1	*See* UCRL-88376	DE83007349	MN -48	8:21973
CONF-821168-	(4. cryogenics intersociety symposium, Los Angeles, CA, USA, 14-18 Nov 1982)			
1	Inst. of Gas Tech., 3424 South State Street, IIT Center, Chicago, IL 60616		MN -38	8:21333
CONF-821169-	(43. glass problems conference, Columbus, OH, USA, 10-11 Nov 1982)			
1	Inst. of Gas Tech., 3424 South State Street-IIT Center, Chicago, IL 60616		MN -11	8:21695
CONF-821170-	(Conference on laser induced damage in optical materials, Boulder, CO, USA, 15-18 Nov 1982)			
1	*See* DOE/ER/10444-7	DE83007501	MN -34	8:21161
CONF-821171-	(Hungarian Academy of Sciences meeting, Budapest, Hungary, 1 Nov 1982)			
1	*See* LA-UR-83-326	DE83007544	MN -34	8:22077
CONF-821172-	(13. annual conference on environmental toxicology, Dayton, OH, USA, 16-18 Nov 1982)			
1	*See* PNL-SA-11110	DE83007843	MN -48	8:22008
CONF-821173-	(3. annual meeting of the Society of Environmental Toxicology and Chemistry, Arlington, VA, USA, 14-17 Nov 1982)			
1	*See* PNL-SA-10533	DE83007844	MN -11	8:21865
CONF-821174-	(1. technical conference polyimides, Ellensville, NY, USA, 1 Nov 1982)			
1	NTIS, PC A02/MF A01; 1	DE83007674	MN -04	8:21060
CONF-821175-	(Symposium on surface mining hydrology, sedimentology, and reclamation, Lexington, KY, USA, 1 Nov 1982)			
1	NTIS, PC A02/MF A01; 1	DE83007965	MN -88	8:19595
CONF-821201-	(Fall DECUS US Symposium, Anaheim, CA, USA, 6-10 Dec 1982)			
13	*See* SLAC-PUB-3008	DE83007017	MN -34D	8:21609
CONF-821211-	(5. DOE battery and electrochemical contractors' conference, Crystal City, VA, USA, 7-9 Dec 1982)			
5	NTIS, PC A02/MF A01	DE83007636	MN -94cb	8:20745
CONF-821219-	(International conference on metastable and modulated semiconductor structures, Pasadena, CA, USA, 6-10 Dec 1982)			
3	*See* SAND-82-2810C	DE83003709	MN -38	8:21166
CONF-821226-	(Low dimensional contractors conference, St. Maurice, France, 10-19 Dec 1982)			
1	*See* SAND-82-1907C	DE83006398	MN -25	8:22558
CONF-821227-	(11. Texas symposium on relativistic astrophysics, Austin, TX, USA, 12-17 Dec 1982)			
1	NTIS, PC A02/MF A01; 1	DE83007789	MN -4	8:21625
CONF-830103-	(2. international topical meeting on nuclear reactor thermal hydraulics, Santa Barbara, CA, USA, 11-13 Jan 1983)			
41	*See* PNL-SA-10557	DE83007045	MN -79p	8:20727
42	*See* PNL-SA-10409	DE83007053	MN -79p	8:20726

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CONF-830107-	(IEEE Power Engineering Society winter meeting, New York, NY, USA, 31 Jan 1983)			
3	*See* PNL-SA-10890	DE83007051	MN -60	8:20235
CONF-830108-	(6. ASME energy sources technology conference and exhibition, Houston, TX, USA, 30 Jan-3 Feb 1983)			
3	*See* PNL-SA-10653	DE83007044	MN -60	8:20234
CONF-830114-	(Energy from biomass and wastes symposium, Lake Buena Vista, FL, USA, 24-28 Jan 1983)			
5	*See* PNL-SA-11039	DE83008024	MN -61a	8:20019
CONF-830122-	(Electric Power Research Institute cool storage workshop, Palo Alto, CA, USA, 19-20 Jan 1983)			
3	NTIS, PC A02/MF A01; 1	DE83007508	MN -95d	8:20896
CONF-830123-	(SPIE meeting on laser processing of semiconductor devices, Los Angeles, CA, USA, 1 Jan 1983)			
1	*See* SAND-82-2986C	DE83005192	MN -37	8:21167
CONF-830125-	(SAS users group international conference, New Orleans, LA, USA, 16-19 Jan 1983)			
1	*See* Y/DJ-25-016	DE83007088	MN -32	8:22879
CONF-830126-	(Conference on modeling and simulation on microcomputers, San Diego, CA, USA, 27-29 Jan 1983)			
1	*See* EGG-M-19582	DE83006524	MN -78	8:20355
2	*See* PNL-SA-10833	DE83007052	MN -41	8:20728
CONF-830127-	(Winter colloquium on quantum electronics, Snowbird, UT, USA, 12-14 Jan 1983)			
1	*See* UCRL-88657	DE83007352	MN -21	8:21402
CONF-830128-	(International conference on photochemistry and photobiology, Alexandria, Egypt, 5-10 Jan 1983)			
1	*See* LBL-15480	DE83006190	MN -34A	8:21271
CONF-830129-	(Solar pond workshop group meeting, Chattanooga, TN, USA, 25-26 Jan 1982)			
1	*See* LA-UR-83-325	DE83007543	MN -59c	8:20128
CONF-830204-	(International beta dosimetry symposium, Washington, DC, USA, 15-18 Feb 1983)			
3	*See* PNL-SA-11106	DE83007077	MN -41	8:21971
4	*See* LA-UR-83-290	DE83007575	MN -37	8:21579
5	*See* PNL-SA-10656-A	DE83007846	MN -41	8:21588
6	*See* PNL-SA-10638	DE83007841	MN -41	8:21587
7	*See* PNL-SA-10696	DE83007842	MN -41	8:19894
8	*See* PNL-SA-10670	DE83007845	MN -37	8:21589
CONF-830205-	(Waste management conference, Tucson, AZ, USA, 27 Feb-3 Mar 1983)			
11	*See* LA-UR-83-307	DE83007541	MN -70	8:19833
12	*See* RFP-3492	DE83007536	MN -10	8:19863
CONF-830207-	(DOBIS/LIBIS library system conference, Paris, France, 17-23 Feb 1983)			
1	*See* SAND-83-0269C	DE83006206	MN -32	8:22877
CONF-830208-	(7. meeting of the IEA solar heating and cooling program, Innsbruck, Austria, 5 Feb 1983)			
1	*See* PNL-SA-11128	DE83006615	MN -94a	8:20740
CONF-830209-	(US/Japan joint workshop on the reassessment of A-bomb radiation dosimetry in Hiroshima and Nagasaki, Nagasaki, Japan, 16 Feb 1983)			
1	*See* UCID-19676	DE83006396	MN -41	8:21935
2	*See* LA-UR-83-198	DE83007574	MN -41	8:21668
CONF-830210-	(5. topical conference on radio frequency plasma heating, Madison, WI, USA, 21-23 Feb 1983)			
1	*See* GA-A-16984	DE83006950	MN -20f	8:22604
2	*See* UCRL-88553	DE83007361	MN -20g	8:22750
4	*See* UCRL-88541	DE83007364	MN -20d	8:22633
5	*See* LA-UR-83-463	DE83007562	MN -20f	8:22624
6	*See* LBL-15672	DE83008396	MN -20a	8:22625
CONF-830211-	(5. energy audit symposium and productivity exposition of the Association of Energy Engineers, Los Angeles, CA, USA, 17-18 Feb 1983)			
1	*See* LBL-15374	DE83006953	MN -95d	8:20907
CONF-830213-	(10. energy technology conference, Washington, DC, USA, 28 Feb-2 Mar 1983)			
1	Institute of Gas Technology, 3424 South State Street, IIT Center, Chicago, IL 60616		MN -61a	8:20997
2	*See* SAND-83-0155C	DE83006292	MN -63b	8:20048
CONF-830214-	(Workshop on future directions in transplutonium element research, Washington, DC, USA, 28 Feb-2 Mar 1983)			
1	*See* LBL-15685	DE83006967	MN -34C	8:22392
CONF-830215-	(International conference on ultrastructure processing of ceramics, glasses and composites, Gainesville, FL, USA, 14-18 Feb 1983)			
1	*See* SAND-83-1098C	DE83007032	MN -25	8:21168
2	*See* LA-UR-83-367	DE83007551	MN -25	8:21125
CONF-830216-	(Acid rain program review meeting, Raleigh, NC, USA, 21-25 Feb 1983)			
1	NTIS, PC A02/MF A01	DE83007506	MN -11	8:21991
2	NTIS, PC A02/MF A01; 1	DE83007507	MN -11	8:21696
CONF-830217-	(Milford event meeting, Milford, PA, USA, 19-21 Feb 1983)			
1	*See* LA-UR-83-359	DE83007550	MN -58b	8:20098

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CONF-830301-	(ASME-JSME thermal engineering joint conference, Honolulu, HI, USA, 20-24 Mar 1983)			
8	*See* SERI/TP-252-1853	DE83007311	MN -62	8:20078
CONF-830307-	(6. American Meteorological Society symposium on turbulence and diffusion, Boston, MA, USA, 22-25 Mar 1983)			
12	*See* PNL-SA-10634	DE83007851	MN -11	8:21684
CONF-830308-	(American Institute of Chemical Engineers national meeting, Houston, TX, USA, 27-31 Mar 1983)			
5	*See* DOE/FC-1011	DE83006946	MN -90d	8:19431
6	*See* SAND-83-7013C	DE83007839	MN -94cc	8:20752
CONF-830311-	(Particle accelerator conference, Santa Fe, NM, USA, 21-23 Mar 1983)			
3	*See* LA-UR-83-299	DE83007540	MN -28	8:21559
4	*See* BNL-32546	DE83007394	MN -28	8:21484
CONF-830314-	(2. national conference on high power microwave technology, Adelphi, MD, USA, 1-3 Mar 1983)			
1	*See* SAND-82-2900C	DE83006808	MN -28	8:21477
2	*See* UCRL-88702	DE83007353	MN -38	8:21621
3	*See* UCRL-88737	DE83007348	MN -38	8:21495
4	*See* LA-UR-83-407	DE83007556	MN -34	8:21444
CONF-830315-	(GSA symposium on geological licensing topics in high- and low-level nuclear waste, College Station, TX, USA, 3-4 Mar 1983)			
1	*See* SAND-82-2413C	DE83006204	MN -70	8:19868
CONF-830316-	(Distrubuted solar collector conference, Albuquerque, NM, USA, 15-17 Mar 1983)			
1	*See* SAND-83-1060C	DE83007031	MN -62e	8:20134
CONF-830317-	(TMS/AIME meeting, Atlanta, GA, USA, 6-10 Mar 1983)			
1	*See* LBL-15293	DE83006747	MN -25	8:21126
CONF-830318-	(5. power plant dynamics control and testing symposium, Knoxville, TN, USA, 21-23 Mar 1983)			
1	NTIS MF A01; 2	DE83006906	MN -78	8:20352
CONF-830319-	(US Air Force Academy energy management personnel meeting, Colorado Springs, CO, USA, 1 Mar 1982)			
1	*See* LA-UR-83-397	DE83007554	MN -95d	8:20905
CONF-830320-	(3. international conference on numerical methods in thermal problems, Seattle, WA, USA, 1 Mar 1982)			
1	*See* LA-UR-83-519	DE83007565	MN -38	8:21423
CONF-830401-	(5. ISRM congress, Melbourne, Australia, 10-15 Apr 1983)			
1	*See* SAND-82-0282C	DE82010080	MN -92a	8:19767
CONF-830402-	(International conference on weat of materials - mechanisms and control of wear, Washington, DC, USA, 11-14 Apr 1983)			
1	*See* LA-UR-82-2428	DE82021890	MN -25	8:21072
2	*See* LBL-14911	DE83002571	MN -25	8:21074
CONF-830405-	(6. annual ASME technical conference on commercial building heating and cooling applications, Orlando, FL, USA, 19-21 Apr 1983)			
1	*See* LA-UR-82-2986	DE83002082	MN -98F	8:19974
2	*See* SAND-82-1790C	DE83002518	MN -63c	8:20046
3	*See* SERI/TP-254-1732	DE83005110	ND -59c	8:20107
5	*See* SERI/TP-252-1775	DE83005130	MN -62d	8:20068
6	*See* SERI/TP-252-1869	DE83005127	MN -59b	8:20103
7	*See* SERI/TP-234-1785	DE83005128	ND -62b	8:20102
8	*See* SERI/TP-253-1839	DE83005129	ND -62	8:20135
9	*See* LA-UR-83-3	DE83006047	MN -59c	8:20097
10	*See* SERI/TP-211-1851	DE83005712	MN -60	8:20238
11	*See* BNL-32417	DE83005908	MN -95d	8:20894
12	*See* SERI/TP-253-1870	DE83006030	ND -59b	8:20136
13	*See* SERI/TP-253-1830	DE83005298	ND -62	8:20104
14	*See* SERI/TP-253-1831	DE83005301	ND -2	8:20105
15	*See* SERI/TP-254-1807	DE83005299	MN -59c	8:20938
16	*See* SERI/TP-253-1871	DE83007214	MN -62	8:20106
17	*See* SERI/TP-253-1893	DE83007312	MN -62b	8:20137
18	*See* SAND-82-1970C	DE83008183	MN -62a	8:20132
CONF-830406-	(5. topical meeting on technology of fusion energy, Knoxville, TN, USA, 26-28 Apr 1983)			
1-Summ.	*See* LBL-15066-Summ.	DE83002557	MN -20d	8:22739
2	*See* UCRL-15514	DE83004309	MN -20d	8:22746
3	NTIS, PC A02/MF A01	DE83005315	MN -20	8:22702
CONF-830407-	(International conference on acoustics, speech, and signal processing, Boston, MA, USA, 14-16 Apr 1983)			
1	*See* SAND-82-2937C	DE83005009	MN -32	8:21631
CONF-830408-	(28. national Society for the Advancement of Materials Process Engineers symposium, Anaheim, CA, USA, 12-14 Apr 1983)			
1	*See* UCRL-88513	DE83004804	MN -25	8:21143
2	*See* UCRL-88107	DE83005336	MN -96	8:21032
3	*See* DOE/NASA/20320-43	DE83005344	STD -60	8:20212
CONF-830410-	(17. Middle Atlantic Regional meeting of the American Chemical Society, White Haven, PA, USA, 6-8 Apr 1983)			
1	*See* LA-UR-83-260	DE83006066	MN -4	8:21251
CONF-830411-	(29. Institute of Environmental Sciences technical meeting, Los Angeles, CA, USA, 18-21 Apr 1983)			
1	*See* K/PS-5003S	DE83005878	MN -12	8:21736

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CONF-830412-	(5. symposium on meteorological observations and instrumentation, Toronto, Canada, 11-15 Apr 1983)			
1	*See* BNL-32339	DE83005793	MN -11	8:21689
CONF-830414-	(5. annual international conference on computer capacity management, New Orleans, LA, USA, 18-21 Apr 1983)			
1	*See* UCRL-88735	DE83007345	MN -32	8:22893
CONF-830416-	(American Nuclear Society workshop on power plant security, Savannah, GA, USA, 24-27 Apr 1983)			
1	*See* SAND-82-2852C	DE83007409	MN -15	8:20317
CONF-830417-	(7. international symposium on ballistics, Hague, Netherlands, 19-21 Apr 1983)			
1	*See* UCRL-88532	DE83007359	MN -35	8:21656
CONF-830418-	(International conference on dimensional stability and mechanical behavior of irradiated metals and alloys, Brighton, UK, 11-14 Apr 1983)			
1	NTIS, PC A02/MF A01	DE83007815	MN -25	8:21061
CONF-830419-	(16. rare earth research conference, Tallahassee, FL, USA, 18-21 Apr 1983)			
1	*See* LA-UR-83-352	DE83007549	MN -34A	8:22196
CONF-830420-	(Society of Photo-Optical Instrumentation Engineers conference, Arlington, VA, USA, 4-8 Apr 1983)			
1	*See* LA-UR-83-512	DE83007564	MN -34	8:22563
2	*See* LA-UR-83-409	DE83007557	MN -04	8:21216
CONF-830421-	(20. space congress, Cocoa Beach, FL, USA, 26-28 Apr 1983)			
1	*See* LA-UR-83-449	DE83007561	MN -33	8:20448
CONF-830422-	(Workshop on high temperature geothermal wells: planning, drilling and completion, Reno, NV, USA, 5-7 Apr 1983)			
1	*See* SAND-83-0422C	DE83007603	MN -66c	8:20184
CONS-				
5459-1	*See* DOE/CS/40094-T1	DE83007494	MN -95f	8:20966
COO-				
1195-474	*See* DOE/ER/01195-474	DE83007418	MN -34D	8:22250
1195-479	*See* DOE/ER/01195-479	DE83007419	MN -34D	8:22251
2197-78	*See* DOE/ER/02197-78	DE83003047	MN -34D	8:22188
2218-258	*See* DOE/ET/52040-T7	DE83007190	MN -20	8:22724
2218-268	*See* CONF-830406-3	DE83005315	MN -20	8:22702
3244-102	*See* DOE/ER/03244-102	DE83008136	MN -34	8:22252
CPG-				
1-14	*See* AD-A-119914/0			8:22897
CRREL-				
82-22	*See* AD-A-119595/7			8:20892
CW-WR-				
76-020.104A	NTIS, PC A08/MF A01; 1	DE83007342	STD -90e	8:20246
DCN-				
82-212-011-42	*See* DOE/SF/11503-T2	DE83007415	MN -66d	8:20175
DDS-				
033	Solar Energy Research Inst., Golden, CO			8:19956
108	Solar Energy Research Inst., 1617 Cole Boulevard, Golden, CO 80401			8:19986
DE-				
82-000154	NTIS, PC A07/MF A01			8:21993
DOE/AD/11209-				
T14	NTIS, PC A08/MF A01; 1	DE83005222	MN -93	8:20247
DOE/AL/10752-				
17	NTIS, PC A04/MF A01; 1	DE83007493	MN -70	8:22028
19	NTIS, PC A03/MF A01	DE83007954	MN -70	8:19816
DOE/AL/17575-				
T1	NTIS, PC A04/MF A01	DE83007201	MN -96	8:21011
DOE/AL/19929-				
T3	NTIS, PC A03/MF A01	DE83006998	MN -62	8:19971
T7	NTIS MF A01; 2	DE83006992	MN -62	8:20055
DOE/AL/20601-				
T1	NTIS, PC A05/MF A01; 1	DE83007189	STD -62a	8:20086
DOE/CS/24280-				
2	NTIS, PC A10/MF A01; 1	DE83008109	MN -63c	8:20033
DOE/CS/30007-				
T1	NTIS MF A01; 2	DE83004719	MN -59c	8:20087
DOE/CS/40094-				
T1	NTIS, PC A05/MF A01; 1	DE83007494	MN -95f	8:20966
T2	NTIS, PC A09/MF A01; 1	DE83901504	MN -95f	8:20967
DOE/CS/40538-				
T1	NTIS, PC A08/MF A01	DE83005494	MN -98E	8:20815
T2	NTIS, PC A08/MF A01; 1	DE83007985	MN -98G	8:20816
DOE/CS/56051-				
8	NTIS, PC A07/MF A01	DE83008127	STD -96	8:21012
DOE/DP/40166-				
1	NTIS, PC A02/MF A01	DE83007905	MN -21	8:22703
DOE/EI/10750-				
T1	NTIS, PC A03/MF A01; 1	DE83007184	MN -98F	8:20771
DOE/EI/10754-				
T17	NTIS, PC A04/MF A01; 1	DE83007290	MN -98F	8:19753
DOE/EIA-				
0008(81/ 4Q)	NTIS, PC A03/MF A01; 1	DE83008061	MN -98G	8:19647
0008(82/ 1Q)	NTIS, PC A03/MF A01	DE83008060	MN -98G	8:19648

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0008(82/ 2Q)	NTIS, PC A03/MF A01; 1	DE83008059	MN -98G	8:19691
0008(82/ 3Q)	NTIS, PC A03/MF A01	DE83008043	MN -98G	8:20789
0032(82/ 01)	NTIS, PC A02/MF A01	DE83007897	MN -98B	8:19692
0032(82/ 02)	NTIS, PC A02/MF A01	DE83008089	MN -98B	8:19693
0032(82/ 03)	NTIS, PC A02/MF A01	DE83008107	MN -98B	8:19694
0032(82/ 05)	NTIS, PC A02/MF A01	DE83008106	MN -98B	8:19695
0032(82/ 06)	NTIS, PC A02/MF A01	DE83008105	MN -98B	8:19696
0032(82/ 07)	NTIS, PC A02/MF A01	DE83008042	MN -98B	8:19697
0035(82/ 05)	NTIS, PC A06/MF A01	DE83008093	MN -98G	8:20855
0035(82/ 06)	NTIS, PC A06/MF A01	DE83007964	MN -98G	8:20856
0035(82/ 07)	NTIS, PC A06/MF A01	DE83008091	MN -98G	8:20857
0035(82/ 08)	NTIS, PC A06/MF A01	DE83008092	MN -98G	8:19698
0035(82/ 09)	NTIS, PC A06/MF A01; 1	DE83008090	MN -98G	8:20858
0035(82/ 10)	NTIS, PC A06/MF A01; 1	DE83008010	MN -98G	8:19649
0035(82/ 11)	NTIS, PC A06/MF A01; 1	DE83008012	MN -98G	8:20859
0035(82/ 12)	NTIS, PC A06/MF A01	DE83008044	MN -98G	8:19699
0064(82)	NTIS, PC A04/MF A01; 1	DE83008013	MN -98A	8:19398
0075(82/ 02)	NTIS, PC A04/MF A01; 1	DE83008020	MN -98E	8:20249
0075(82/ 03)	NTIS, PC A04/MF A01	DE83008019	MN -98E	8:20250
0075(82/ 06)	NTIS, PC A04/MF A01; 1	DE83008007	MN -98E	8:20251
0075(82/ 07)	NTIS, PC A04/MF A01	DE83008008	MN -98E	8:20252
0075(82/ 08)	NTIS, PC A04/MF A01; 1	DE83008027	MN -98E	8:20253
0095(81)	NTIS, PC A14/MF A01; 1	DE83008029	MN -98E	8:20254
0109(82/ 03)	NTIS, PC A06/MF A01; 1	DE83008053	MN -98B	8:19700
0109(82/ 04)	NTIS, PC A06/MF A01; 1	DE83008054	MN -98B	8:19701
0109(82/ 05)	NTIS, PC A06/MF A01; 1	DE83008057	MN -98B	8:19702
0109(82/ 06)	NTIS, PC A06/MF A01; 1	DE83008056	MN -98B	8:19703
0109(82/ 07)	NTIS, PC A06/MF A01; 1	DE83008055	MN -98B	8:19704
0109(82/ 08)	NTIS, PC A06/MF A01; 1	DE83008064	MN -98B	8:19705
0109(82/ 09)	NTIS, PC A06/MF A01; 1	DE83008063	MN -98B	8:19706
0109(82/ 10)	NTIS, PC A06/MF A01	DE83008017	MN -98B	8:19707
0109(82/ 11)	NTIS, PC A06/MF A01; 1	DE83008009	MN -98B	8:19708
0109(82/ 12)	NTIS, PC A06/MF A01; 1	DE83008088	MN -98B	8:19709
0121(81/ 3Q)	NTIS, PC A02/MF A01; 1	DE83008050	MN -98A	8:19425
0121(81/ 4Q)	NTIS, PC A03/MF A01; 1	DE83008049	MN -98A	8:19426
0121(82/ 1Q)	NTIS, PC A05/MF A01	DE83008048	MN -98A	8:19650
0121(82/ 2Q)	NTIS, PC A05/MF A01	DE83007995	MN -98A	8:19651
0125(81/ 4Q)	NTIS, PC A08/MF A01; 1	DE83008067	MN -98A	8:19652
0125(82/ 1Q)	NTIS, PC A05/MF A01; 1	DE82012718	MN -98A	8:19653
0125(82/ 2Q)	NTIS, PC A05/MF A01	DE83008003	MN -98A	8:19654
0130(82/ 10)	NTIS, PC A06/MF A01; 1	DE83008094	MN -98C	8:19754
0130(82/ 11)	NTIS, PC A05/MF A01	DE83008095	MN -98C	8:19755
0130(82/ 12)	NTIS, PC A05/MF A01; 1	DE83008289	MN -98C	8:19756
0145(81)	NTIS, PC A12/MF A01; 1	DE83008781	MN -98C	8:19757
0167(81) P	NTIS, PC A02/MF A01	DE83008158	MN -98C	8:20806
0191(81)	NTIS, PC A09/MF A01; 1	DE83006469	MN -98E	8:20817
0202/ 9-2	NTIS, PC A05/MF A01	DE83008096	MN -98	8:20757
0202(82/ 1Q)	NTIS, PC A04/MF A01; 1	DE83008097	MN -98	8:19710
0202(82/ 2Q) -1	NTIS, PC A03/MF A01; 1	DE83008288	MN -98F	8:19711
0202(82/ 3Q)	NTIS, PC A05/MF A01; 1	DE83008068	MN -98G	8:19712
0202(82/ 4Q) -1	NTIS, PC A03/MF A01; 1	DE83008087	MN -98	8:19713
0205(82/ 4Q)	NTIS, PC A04/MF A01	DE83008028	MN -98	8:20753
0219(81)	NTIS, PC A06/MF A01; 1	DE83008066	MN -98G	8:19672
0226(82/ 01)	NTIS, PC A08/MF A01; 1	DE83007733	MN -98E	8:20818
0226(82/ 03)	NTIS, PC A08/MF A01; 1	DE83008286	MN -98E	8:20819
0226(82/ 08)	NTIS, PC A06/MF A01; 1	DE83008005	MN -98E	8:20820
0226(82/ 09)	NTIS, PC A06/MF A01; 1	DE83008287	MN -98E	8:20821
0267	NTIS, PC A99/MF A01; 1	DE83006457	MN -98	8:20790
0321/ 1	NTIS, PC A11/MF A01; 1	DE83008001	MN -98G	8:20860
0344	NTIS, PC A99/MF A01; 1	DE83006468	MN -98G	8:20822
0348(81)	NTIS, PC A09/MF A01; 1	DE83008074	MN -98E	8:20823
0349/ 2	NTIS, PC A06/MF A01	DE83008002	MN -98	8:20772
0357	NTIS, PC A08/MF A01; 1	DE83008025	MN -98C	8:19758
0358	NTIS, PC A04/MF A01	DE83008811	MN -98	8:20861
0360(80)	NTIS, PC A04/MF A01; 1	DE83008026	MN -98F	8:20863
0361	NTIS, PC A02/MF A01	DE83008073	MN -98B	8:19714
0372/ 1	NTIS, PC A05/MF A01	DE83008788	MN -98B	8:19674
0372/ 2	NTIS, PC A05/MF A01; 1	DE83008787	MN -98B	8:19675
DOE/EIS-				
0089D	NTIS, PC A12/MF A01; 1	DE83008561	MN -11	8:21891
DOE/EP-				
0038/ 1	NTIS, PC A04/MF A01	DE83008175	STD -41	8:21831
0045/ 1	NTIS, PC A02/MF A01	DE83008298	STD -92	8:19744
0046/ 4	NTIS, PC A02/MF A01	DE83008365	MN -92	8:19745
DOE/EP/12079-				
T4	NTIS, PC A02/MF A01	DE83008771	MN -11	8:21698
DOE/ER-				
0045/ 9	NTIS, PC A15/MF A01; 1	DE83006357	STD -20c	8:22704
DOE/ER/01195-				
474	NTIS, PC A10/MF A01; 1	DE83007418	MN -34D	8:22250
479	NTIS, PC A03/MF A01	DE83007419	MN -34D	8:22251
DOE/ER/02197-				
78	NTIS, PC A02/MF A01	DE83003047	MN -34D	8:22188
DOE/ER/03023-				
31	NTIS, PC A03/MF A01; 1	DE83007503	MN -34D	8:22244

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DOE/ER/03244-				
102	NTIS, PC A11/MF A01; 1	DE83008136	MN -34	8:22252
DOE/ER/03463-				
91	NTIS, PC A03/MF A01; 1	DE83007974	MN -34C	8:22397
DOE/ER/03533-				
1	NTIS, PC A03/MF A01; 1	DE83007601	MN -34D	8:22245
DOE/ER/03569-				
T2	NTIS, PC A02/MF A01	DE83007850	MN -4	8:21265
DOE/ER/04380-				
6	NTIS, PC A02/MF A01; 1	DE83007147	MN -94d	8:21266
DOE/ER/04936-				
8	NTIS, PC A04/MF A01; 1	DE83008192	MN -34C	8:22343
DOE/ER/04939-				
5	NTIS, PC A02/MF A01; 1	DE83007983	MN -38	8:21295
DOE/ER/10060-				
T1	NTIS, PC A19/MF A01; 1	DE83006495	MN -11	8:22023
DOE/ER/10361-				
T1	NTIS, PC A06/MF A01	DE83007278	MN -11	8:22057
DOE/ER/10390-				
5	NTIS, PC A04/MF A01; 1	DE83007523	MN -25	8:21158
DOE/ER/10429-				
4	NTIS, PC A02/MF A01	DE83007982	MN -25	8:21066
DOE/ER/10431-				
T1	NTIS, PC A04/MF A01; 1	DE83008079	MN -34A	8:22189
DOE/ER/10433-				
T1	NTIS, PC A02/MF A01	DE83007912	MN -25	8:21067
DOE/ER/10438-				
7	NTIS, PC A02/MF A01	DE83005821	MN -25	8:21159
DOE/ER/10444-				
6	NTIS, PC A02/MF A01	DE83007975	MN -34	8:21160
7	NTIS, PC A02/MF A01; 1	DE83007501	MN -34	8:21161
DOE/ER/10459-				
38	NTIS, PC A02/MF A01	DE83007336	MN -34A	8:21441
DOE/ER/10485-				
T3	NTIS, PC A03/MF A01	DE83007299	MN -4	8:21230
DOE/ER/10493-				
12	NTIS, PC A03/MF A01; 1	DE83007331	MN -4	8:22369
DOE/ER/10516-				
15	NTIS, PC A02/MF A01	DE83008331	MN -34C	8:22370
DOE/ER/10570-				
T1	NTIS, PC A02/MF A01	DE83000993	MN -38	8:21068
DOE/ER/10625-				
T1	NTIS, PC A03/MF A01; 1	DE83002267	MN -4	8:19932
DOE/ER/10645-				
7	NTIS MF A01; 2	DE83007322	MN -4	8:19685
9	NTIS, PC A04/MF A01	DE83007320	MN -4	8:21191
DOE/ER/10651-				
T1-Vol.1	NTIS, PC A15/MF A01; 1	DE83007252	MN -32	8:22590
T1-Vol.2	NTIS, PC A15/MF A01; 1	DE83007251	MN -32	8:22561
DOE/ER/10654-				
T1	NTIS, PC A03/MF A01; 1	DE83006563	MN -25	8:21122
DOE/ER/10676-				
3	NTIS, PC A02/MF A01	DE83006556	MN -34	8:22599
DOE/ER/10710-				
3	NTIS, PC A02/MF A01; 1	DE83008268	MN -34C	8:22358
DOE/ER/10763-				
2	NTIS, PC A02/MF A01; 1	DE83008082	MN -66a	8:20147
DOE/ER/10766-				
9	NTIS, PC A02/MF A01; 1	DE83004070	MN -38	8:20255
DOE/ER/10893-				
1	NTIS, PC A03/MF A01; 1	DE83007968	MN -4	8:22190
DOE/ER/10902-				
2	NTIS, PC A02/MF A01	DE83007949	MN -48	8:21909
DOE/ER/10908-				
2	NTIS, PC A02/MF A01; 1	DE83007329	MN -25	8:22191
DOE/ER/10922-				
2	NTIS, PC A02/MF A01; 1	DE83008080	MN -4	8:21145
DOE/ER/10979-				
2	NTIS, PC A03/MF A01	DE83008369	MN -34	8:21387
DOE/ER/12069-				
T1	NTIS, PC A02/MF A01	DE83007504	MN -4	8:21123
DOE/ER/13002-				
T1	NTIS, PC A02/MF A01	DE83007972	MN -25	8:21198
DOE/ER/13004-				
1	NTIS, PC A02/MF A01	DE83007420	MN -34	8:21162
DOE/ER/40008-				
29	NTIS, PC A04/MF A01; 1	DE83006482	MN -34D	8:22283
DOE/ER/40010-				
964	NTIS, PC A02/MF A01	DE83007325	MN -34D	8:22192
965	NTIS, PC A02/MF A01	DE83007298	MN -34A	8:21517
DOE/ER/40016-				
T1	NTIS, PC A04/MF A01; 1	DE83000719	MN -34C	8:22344
DOE/ER/53131-				
T1	NTIS, PC A02/MF A01	DE83008367	MN -20a	8:22600

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DOE/ER/53134-				
1	NTIS, PC A04/MF A01	DE83008267	MN -34	8:22601
DOE/ER/60002-				
1	NTIS, PC A06/MF A01; 1	DE83008178	MN -61a	8:19987
DOE/ET/10143-				
T30	NTIS, PC A04/MF A01; 1	DE83006750	MN -90d	8:19596
T31	NTIS, PC A03/MF A01	DE83006749	MN -90d	8:19427
T34	NTIS, PC A08/MF A01; 1	DE83005848	MN -90d	8:19428
DOE/ET/11320-				
T9	NTIS, PC A05/MF A01; 1	DE83007925	MN -93	8:20887
DOE/ET/11426-				
T2	NTIS MF A01; 2	DE83007040	MN -90a	8:19545
DOE/ET/12066-				
1	NTIS, PC A02/MF A01	DE83007895	MN -48	8:21910
DOE/ET/12138-				
1335	NTIS, PC A02/MF A01	DE83006561	STD -92a	8:22029
DOE/ET/12140-				
1346	NTIS, PC A05/MF A01; 1	DE83006387	STD -92a	8:19750
DOE/ET/12548-				
16	NTIS, PC A06/MF A01	DE83007267	STD -88	8:19608
DOE/ET/13332-				
T2	NTIS, PC A03/MF A01	DE83008422	MN -95f	8:20968
DOE/ET/13350-				
T5	NTIS, PC A04/MF A01; 1	DE83007890	STD -90b	8:19615
T6	NTIS, PC A04/MF A01; 1	DE83007891	STD -90b	8:19616
DOE/ET/13702-				
T1	NTIS, PC A02/MF A01	DE83005670	MN -90c	8:19429
DOE/ET/14146-				
2	NTIS, PC A02/MF A01	DE83008366	MN -88	8:19597
DOE/ET/14180-				
T1	NTIS, PC A06/MF A01; 1	DE83006382	STD -88	8:19609
DOE/ET/14700-				
13	NTIS, PC A06/MF A01; 1	DE83005696	STD -90d	8:19430
DOE/ET/14858-				
T2	NTIS, PC A16/MF A01; 1	DE83004857	STD -90d	8:19541
DOE/ET/15611-				
T7	NTIS, PC A11/MF A01; 1	DE83007901	MN -90g	8:20875
T8	NTIS, PC A09/MF A01	DE83007902	MN -90g	8:20876
DOE/ET/20279-				
177	NTIS, PC A19/MF A01; 1	DE83008294	STD -63d	8:20034
219	NTIS, PC A08/MF A01; 1	DE83008259	STD -63	8:20035
221	NTIS, PC A03/MF A01; 1	DE83007476	STD -63	8:20036
235	NTIS, PC A05/MF A01; 1	DE83008128	STD -63	8:20037
238	NTIS, PC A05/MF A01; 2	DE83008260	STD -63	8:20038
DOE/ET/20480-				
T1	NTIS, PC A24/MF A01; 1	DE83007894	MN -64	8:20072
DOE/ET/23197-				
T10	NTIS, PC A03/MF A01	DE83006970	MN -63b	8:19988
DOE/ET/27010-				
1	NTIS, PC A05/MF A01; 1	DE83008083	MN -66a	8:20154
DOE/ET/27014-				
T4	NTIS, PC A13/MF A01; 1	DE83000906	MN -66a	8:20144
DOE/ET/28365-				
T2	NTIS, PC A08/MF A01; 1	DE83006663	MN -66a	8:20145
DOE/ET/29368-				
T13	NTIS, PC A05/MF A01	DE83008368	MN -94ca	8:20748
T14	NTIS, PC A03/MF A01	DE83008392	MN -94ca	8:20749
DOE/ET/34015-				
3	NTIS, PC A04/MF A01; 1	DE83008261	STD -78	8:20353
DOE/ET/34019-				
2	NTIS, PC A05/MF A01; 1	DE83007923	MN -78	8:20354
DOE/ET/34203-				
46	NTIS, PC A07/MF A01; 1	DE83007939	STD -78	8:20326
DOE/ET/34215-				
31	NTIS (US Sales Only), PC A04/MF A01	DE83007205	STD -78	8:20327
DOE/ET/37227-				
5	NTIS, PC A06; 3	DE82013559	ND -79p	8:20422
DOE/ET/37240-				
94	NTIS, PC A03/MF A01; 1	DE83007498	MN -79e	8:20423
97TR	NTIS, PC A12/MF A01; 1	DE83007502	MN -79e	8:20424
99	NTIS, PC A04/MF A01; 1	DE83007497	MN -79e	8:20425
DOE/ET/41900-				
16	NTIS, PC A04/MF A01; 1	DE83007885	STD -70	8:19821
17	NTIS, PC A07/MF A01	DE83006235	STD -70	8:19822
18	NTIS, PC A06/MF A01	DE83007892	STD -70	8:19823
DOE/ET/52040-				
T7	NTIS, PC A07/MF A01; 1	DE83007190	MN -20	8:22724
DOE/ET/53016-				
80	NTIS, PC A06/MF A01	DE83008131	MN -20f	8:22602
DOE/ET/53136-				
3	NTIS, PC A02/MF A01	DE83007924	MN -20g	8:22603
DOE/EV-				
0005/ 22	NTIS, PC A07/MF A01	DE83007808	STD -70A	8:19890
DOE/EV/02777-				
T1	NTIS, PC A05/MF A01; 1	DE83007878	MN -48	8:21912

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DOE/EV/03161-				
2	NTIS, PC A02/MF A01; 1	DE83007697	MN -48	8:21666
T1	NTIS, PC A03/MF A01; 1	DE83007691	MN -48	8:21667
DOE/EV/04268-				
T1	NTIS, PC A04/MF A01; 1	DE83007979	MN -48	8:21913
DOE/EV/04329-				
2	NTIS, PC A02/MF A01	DE83007896	MN -48	8:21994
DOE/EV/04763-				
T1	NTIS, PC A05/MF A01; 1	DE83007915	MN -11	8:19680
DOE/EV/04992-				
T1	NTIS, PC A02/MF A01	DE83007973	MN -41	8:21946
DOE/EV/05784-				
5	NTIS, PC A02/MF A01	DE83007967	MN -34A	8:22193
DOE/EV/10100-				
T2	NTIS, PC A02/MF A01	DE83007327	MN -48	8:21995
DOE/EV/10250-				
1	NTIS, PC A14/MF A01; 1	DE83007505	MN -11	8:21852
DOE/EV/10367-				
27	NTIS, PC A04/MF A01; 1	DE83005645	STD -90i	8:19577
DOE/EV/70272-				
T1	NTIS PC E04/MF $6.35; 1	DE83005079	MN -11	8:21826
DOE/FC-				
1011	NTIS, PC A03/MF A01; 1	DE83006946	MN -90d	8:19431
DOE/FE/05147-				
1371	NTIS, PC A04/MF A01; 1	DE83007400	STD -90c	8:19432
DOE/FE/60138-				
T1	NTIS, PC A02/MF A01	DE83008562	MN -92	8:19399
DOE/ID/12122-				
T1	NTIS, PC A08/MF A01; 1	DE83007221	STD -97e	8:19960
DOE/ID/12162-				
T2	NTIS, PC A07/MF A01; 1	DE83007300	MN -95e	8:20969
DOE/ID/12163-				
T1	NTIS, PC A14/MF A01; 1	DE83008108	MN -95e	8:20970
DOE/ID/12328-				
T1	NTIS, PC A03/MF A01; 1	DE83006754	MN -61a	8:19989
DOE/ID/12331-				
T1	NTIS, PC A04/MF A01; 1	DE83008248	MN -61a	8:19990
DOE/ID/12341-				
T1	NTIS, PC A06/MF A01	DE83008249	MN -61a	8:20088
DOE/ID/12342-				
T1	NTIS, PC A05/MF A01; 1	DE83008247	MN -61a	8:19991
DOE/IR/05114-				
1	NTIS$12.50		STD -13	8:22822
DOE/IR/10903-				
T1	Education Commission of the States, Suite 300, 1860 Lincoln St., Denver, CO 80295			8:20776
DOE/JPL-				
1060-52	NTIS, PC A15/MF A01; 1	DE83000474	STD -62b	8:20056
9950-691	NTIS, PC A03/MF A01; 1	DE83007264	STD -95f	8:20971
9950-776	NTIS, PC A05/MF A01; 1	DE83007263	STD -95f	8:19992
DOE/JPL/954373-				
81/ 19	NTIS, PC A12/MF A01; 1	DE83007035	MN -63b	8:19993
DOE/JPL/956046-				
82/ 5	NTIS, PC A02/MF A01; 1	DE83007848	STD -63b	8:19994
DOE/JPL/956061-				
6	NTIS, PC A03/MF A01	DE83007036	STD -63b	8:19995
DOE/JPL/956312-				
82/ 01	NTIS, PC A02/MF A01; 1	DE83007522	STD -63b	8:19996
83/ 02	NTIS, PC A02/MF A01	DE83007914	MN -63b	8:19997
DOE/JPL/956352-				
1	NTIS, PC A02/MF A01	DE83007496	STD -63b	8:19998
DOE/LLW-				
16T	NTIS, PC A04/MF A01; 1	DE83008173	STD -70B	8:19826
17T	NTIS, PC A07/MF A01; 1	DE83008307	STD -70B	8:19891
DOE/MA-				
0004/ 1	NTIS, PC A04/MF A01	DE83007583	STD -95	8:20898
DOE/MC/08216-				
1330	NTIS, PC A03/MF A01	DE83006484	STD -92a	8:19768
1332	NTIS, PC A08/MF A01; 1	DE83006477	STD -92a	8:19769
1352	NTIS, PC A04/MF A01; 1	DE83007141	STD -92a	8:19763
DOE/MC/14110-				
1227	NTIS, PC A10/MF A01; 1	DE83005061	STD -90e	8:20256
DOE/MC/14129-				
1312	NTIS, PC A02/MF A01; 1	DE83005883	STD -90e	8:20257
1313	NTIS, PC A02/MF A01	DE83005881	STD -90e	8:20258
1314	NTIS MF A01; 2	DE83005882	STD -90e	8:20259
1315	NTIS, PC A02/MF A01; 1	DE83005865	STD -90e	8:20260
1316	NTIS, PC A03/MF A01; 1	DE83006560	STD -90e	8:20261
1317	NTIS, PC A04/MF A01; 1	DE83006385	STD -90e	8:20262
1358	NTIS, PC A04/MF A01; 1	DE83006380	STD -90e	8:20263
1392	NTIS, PC A04/MF A01; 1	DE83007921	STD -90e	8:21451
DOE/MC/14273-				
1325	NTIS MF A01; 2	DE83004680	STD -89	8:19433
DOE/MC/14731-				
1297	NTIS, PC A10/MF A01	DE83006376	STD -90a	8:19434

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DOE/MC/16015-				
1368-Vol.1	NTIS, PC A04/MF A01; 1	DE83007255	STD -92a	8:19764
DOE/MC/19332-				
1319	NTIS, PC A11/MF A01; 1	DE83005062	STD -90e	8:20264
DOE/METC-				
82-42-Vol.2	NTIS, PC A25/MF A01; 1	DE83006564	STD -90i	8:19578
82-51	NTIS, PC A10/MF A01; 1	DE83004848	STD -90c	8:19435
83-51	NTIS, PC A18/MF A01; 1	DE83005672	MN -90i	8:21699
DOE/METC/TPR-				
83-43	NTIS, PC A03/MF A01	DE83005868	STD -90c	8:19472
DOE/NASA/0032-				
15	NTIS, PC A05/MF A01; 1	DE83004802	MN -96	8:21021
DOE/NASA/0129-				
1	NTIS, PC A04/MF A01; 1	DE83007588	STD -60	8:20211
DOE/NASA/0187-				
82/ 1	NTIS, PC A09/MF A01	DE83002880	MN -96	8:21013
DOE/NASA/0251-				
1	NTIS, PC A04/MF A01; 1	DE83008280	STD -94cb	8:20888
DOE/NASA/3249-				
1	NTIS, PC A04/MF A01; 1	DE83008279	STD -90g	8:20877
DOE/NASA/20320-				
43	NTIS, PC A02/MF A01	DE83005344	STD -60	8:20212
DOE/NBB-				
0026	NTIS, PC A04/MF A01; 1	DE83008072	MN -98F	8:19655
DOE/NBM-				
3007365	NTIS, PC A08/MF A01; 1	DE83007365	STD -90b	8:21124
3007519	NTIS, PC A08/MF A01; 1	DE83007519	MN -92a	8:19681
3007675	NTIS, PC A06/MF A01	DE83007675	MN -34D	8:22352
3008145	NTIS, PC A08/MF A01; 1 - GPO	DE83008145	MN -59	8:20091
3008205	NTIS, PC A02/MF A01; 1	DE83008205	MN -90g	8:20878
3008206	NTIS, PC A02/MF A01; 1	DE83008206	MN -90e	8:19632
3008209	NTIS, PC A02/MF A01	DE83008209	MN -11	8:21711
3008210	NTIS, PC A02/MF A01	DE83008210	MN -90c	8:21069
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7704/ I-EN	Luxembourg; Commission of the European Communities (1982).			8:20114
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16984	NTIS, PC A02/MF A01	DE83006950	MN -20f	8:22604
GA/PC-				
000007	NTIS, PC A18/MF A01	DE83008103	MN -77	8:20482
000008	NTIS, PC A17/MF A01	DE83008102	MN -77	8:20483
000040	NTIS, PC A14/MF A01; 1	DE83008100	MN -77	8:20484
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05-1155-000	*See* ORNL/SUB-7846/4	DE83006837	MN -97c	8:20464
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82-102	General Accounting Office, P.O. Box 6015, Gaithersburg, MD 20760		MN -98E	8:20840
82-110	General Accounting Office, P.O. Box 6015, Gaithersburg, MD		MN -95	8:20785
82-123	General Accounting Office, P.O. Box 6015, Gaithersburg, MD		MN -79	8:20426
82-125	General Accounting Office, P.O. Box 6015, Gaithersburg, MD 20760		MN -97	8:20841
82-128	General Accounting Office, P.O. Box 6015, Gaithersburg, MD		MN -79	8:20427
82-131	General Accounting Office, P.O. Box 6015, Gaithersburg, MD 20760		MN -79	8:20428
GAO/HRD-				
82-77	General Accounting Office, P.O. Box 6015, Gaithersburg, MD 20760		MN -95d	8:20904
GAO/ID-				
82-60	US General Accounting Office, P.O. Box 6015, Gaithersburg, MD		MN -13	8:20799
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83-6	General Accounting Office, P.O. Box 6015, Gaithersburg, MD 20760		MN -13	8:20782

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83-27	General Accounting Office, P.O. Box 6015, Gaithersburg, MD 20760		MN -13	8:20813
83-29	General Accounting Office, P.O. Box 6015, Gaithersburg, MD 20760		MN -92	8:19747
83-38	General Accounting Office, P.O. Box 6015, Gaithersburg, MD 20760		MN -11	8:21888
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82-010-Vol.1	NTIS, PC A05/MF A01; 1	DE83008021	MN -77	8:20485
82-011	NTIS, PC A05/MF A01; 1	DE83008101	MN -77	8:20486
82-012	NTIS, PC A02/MF A01	DE83008104	MN -77	8:20487
82-014	NTIS, PC A02/MF A01; 1	DE83007986	MN -77	8:20488
82-015	NTIS, PC A07/MF A01; 1	DE83007993	MN -77	8:20489
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82-010	NTIS, PC A99/MF A01; 1	DE83008265	MN -77	8:20490
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667a	NTIS, PC A02/MF A01	DE83008123	MN -13	8:21443
699	NTIS, PC A02/MF A01; 1	DE83004032	MN -13	8:21431
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6(83)	NTIS, PC A02/MF A01	DE83007328	MN -51	8:19789
11(83)	NTIS, PC A02/MF A01	DE83008322	MN -51	8:19790
14(83)	NTIS, PC A07/MF A01; 1	DE83008323	MN -51	8:19791
379(81)	NTIS, PC A05; 3	DE82007980	ND -51	8:19792
380(81)	NTIS, PC A06; 3	DE82007979	ND -51	8:19793
381-81	NTIS, PC A06; 3	DE82007978	ND -51	8:19794
383(81)	NTIS, PC A07; 3	DE82010923	ND -51	8:19795
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82/ E/ 22	NTIS (US Sales Only), PC A04/MF A01	DE83750188	MN -28	8:21518
82/ E/ 23	NTIS (US Sales Only), PC A02/MF A01	DE83750183	MN -78	8:20693
82/ E/ 48	NTIS (US Sales Only), PC A03/MF A01	DE83901590	MN -60	8:20215
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39	NTIS (US Sales Only), PC A03/MF A01	DE83750179	MN -78	8:20329
49	NTIS (US Sales Only), PC A03/MF A01	DE83750178	MN -70	8:19830
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2/ 81	NTIS (US Sales Only), PC A10/MF A01	DE83750301	MN -11	8:21712
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82-7	NTIS (US Sales Only), PC A02/MF A01	DE83750187	MN -28	8:21492
82-9	NTIS (US Sales Only), PC A03/MF A01	DE83750186	MN -34C	8:22350
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2615	NTIS, PC A03; 3	DE82016161	ND -70	8:19831
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1904-Pt.2-Rev.1	NTIS, PC A05/MF A01; 1	DE83008401	MN -79e	8:20645
2274	NTIS, PC A06/MF A01; 1	DE83008400	MN -78	8:20372
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82-9	NTIS, PC A05/MF A01; 1	DE83008078	STD -20	8:22727
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80-109-110	*See* PB-82-214792			8:19661
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246	NTIS (US Sales Only), PC A11/MF A01; 1	DE83900906	MN -28	8:21575
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9/ UNUP-11	United Nations University, Toho Seimei Building, 15-1 Shibuya 2-chome, Shibuya-ku, Tokyo 150, Japan		ND -13	8:20774
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83-U-16(ARA-481)	*See* DOE/ER/53131-T1	DE83008367	MN -20a	8:22600
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81-30	Available from Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe, Germany, F.R.			8:20808
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81-11	NTIS (US Sales Only), PC A04/MF A01	DE83750191	MN -97d	8:20288
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82/ 9	NTIS (US Sales Only), PC A02/MF A01	DE83900839	MN -37	8:21576
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7211	NTIS (US Sales Only), PC A06/MF A01/ Also available by loan from the TU Vienna, Austria Sign. 156.350 II/Diss.	DE83780156	MN -38	8:21432
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1/ 209	NTIS (US Sales Only), PC A03/MF A01	DE83750189	MN -20f	8:22622
2/ 259	NTIS (US Sales Only), PC A03/MF A01	DE83750190	MN -20d	8:22736
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551	NTIS, PC A11/MF A01			8:22737
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272	Available from Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe (Germany, F.R.)			8:20216
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82-08-503	NTIS PC $15.00/MF A01			8:20842

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8824	NTIS (US Sales Only), PC A02/MF A01			8:19832
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82-99	*See* DOE/ET/12548-16	DE83007267	STD -88	8:19608
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82-55	*See* N-8229715			8:20908
82-66	*See* DOE/JPL-1060-52	DE83000474	STD -62b	8:20056
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1772	NTIS (US Sales Only), PC A08/MF A01	DE83750195	MN -28	8:21493
1793	NTIS (US Sales Only), PC A06/MF A01	DE83750185	MN -77	8:20393
Juel-Conf-				
43	NTIS (US Sales Only), PC A07/MF A01	DE83750180	MN -77	8:20394
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150	NTIS (US Sales Only), PC A03/MF A01	DE83750192	MN -77	8:20402
158	Available from Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe (Germany, F.R.)			8:22364
163	NTIS (US Sales Only), PC A08/MF A01	DE83750300	MN -11	8:21859
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5033	NTIS, PC A02/MF A01	DE83007492	MN -4	8:21214
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5003S	NTIS, PC A02/MF A01; 1	DE83005878	MN -12	8:21736
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3275	NTIS (US Sales Only), PC A04/MF A01	DE83750181	MN -2	8:22894
3392	NTIS (US Sales Only), PC A02/MF A01	DE83750182	MN -4	8:21231
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199	NTIS (US Sales Only), PC A10/MF A01; 1	DE82902709	MN -38	8:21337
222	NTIS (US Sales Only), PC A04/MF A01	DE83750184	MN -92	8:19739
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674	NTIS (US Sales Only), PC A02/MF A01	DE83900869	MN -4	8:21247
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(81) -229(endg.)	NTIS (US Sales Only), PC A04/MF A01	DE83750302	MN -13	8:20809
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9398-MS	NTIS, PC A04/MF A01; 1	DE83008362	STD -70	8:19881
9461-MS	*See* NUREG/CR-2849	DE83007959	MN -78	8:20720
9466-MS-Rev.	NTIS, PC A02/MF A01	DE83007125	STD -38	8:21338
9481-MS	NTIS, PC A03/MF A01	DE83008281	STD -70	8:22058
9552	NTIS, PC A02/MF A01	DE83008363	STD -10	8:21215
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9565-MS	*See* NUREG/CR-3032	DE83007771	MN -70	8:19885
9572-C-Vol.1	NTIS, PC A18/MF A01; 1	DE83005000	STD -34	8:21519
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9576-MS	NTIS, PC A03/MF A01	DE83008277	STD -11	8:21843
9598-PR	NTIS, PC A05/MF A01	DE83008278	STD -33	8:20447
9612-MS	NTIS, PC A02/MF A01; 1	DE83007119	STD -34	8:21650
9614-PR	NTIS, PC A02/MF A01	DE83008357	STD -91	8:19779
9616-T	NTIS, PC A05/MF A011; 1	DE83008359	STD -11	8:22030
9619-MS	NTIS, PC A02/MF A01; 1	DE83008271	STD -78	8:20697
9621-MS	NTIS, PC A02/MF A01; 1	DE83007099	STD -28	8:21494
9624-M	NTIS, PC A05/MF A01; 1	DE83007150	STD -32	8:21439
9625-HDR	NTIS, PC A03/MF A01	DE83007103	MN -66b	8:20149
9629-PR	NTIS, PC A03/MF A01	DE83008276	STD -20d	8:22738
9630-PR	NTIS, PC A02/MF A01	DE83008360	STD -79b	8:20429
9643-MS	NTIS, PC A02/MF A01	DE83007126	STD -28	8:21527
9677-MS	NTIS, PC A03/MF A01	DE83008364	STD -98F	8:19715
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83-4	NTIS, PC A02/MF A01; 1	DE83007270	MN -20	8:22752
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82-2428	NTIS, PC A03/MF A01; 1	DE82021890	MN -25	8:21072
82-2986	NTIS, PC A02/MF A01	DE83002082	MN -98F	8:19974
83-3	NTIS, PC A02/MF A01	DE83006047	MN -59c	8:20097
83-198	NTIS, PC A03/MF A01; 1	DE83007574	MN -41	8:21668
83-260	NTIS, PC A04/MF A01	DE83006066	MN -4	8:21251
83-290	NTIS, PC A02/MF A01; 1	DE83007575	MN -37	8:21579
83-299	NTIS, PC A02/MF A01; 1	DE83007540	MN -28	8:21559
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83-325	NTIS, PC A02/MF A01	DE83007543	MN -59c	8:20128
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83-330	NTIS, PC A02/MF A01; 1	DE83007545	MN -34	8:21388
83-333	NTIS, PC A02/MF A01	DE83007546	MN -34	8:22562
83-348	NTIS, PC A02/MF A01	DE83007547	MN -34B	8:22078
83-352	NTIS, PC A02/MF A01	DE83007549	MN -34A	8:22196
83-359	NTIS, PC A03/MF A01	DE83007550	MN -58b	8:20098
83-367	NTIS, PC A02/MF A01	DE83007551	MN -25	8:21125
83-397	NTIS, PC A07/MF A01; 1	DE83007554	MN -95d	8:20905
83-407	NTIS, PC A02/MF A01	DE83007556	MN -34	8:21444
83-409	NTIS, PC A02/MF A01; 1	DE83007557	MN -04	8:21216
83-413	NTIS, PC A02/MF A01	DE83007558	MN -32	8:22623
83-420	NTIS, PC A02/MF A01	DE83007559	MN -48	8:21904
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83-519	NTIS, PC A02/MF A01; 1	DE83007565	MN -38	8:21423
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13500-Exc.	NTIS, PC A02/MF A01	DE83004954	MN -11	8:21737
13600	NTIS, PC A09/MF A01; 1	DE83004044	STD -13	8:22031
14086	NTIS MF A01; 2	DE83006956	MN -11	8:19853
14390	NTIS, PC A02/MF A01; 1	DE83007065	MN -28	8:21339
14445	NTIS, PC A02/MF A01	DE83007021	MN -28	8:21340
14535	NTIS, PC A04/MF A01; 1	DE83007064	MN -25	8:21073
14782-Rev.	NTIS, PC A05/MF A01; 1	DE83007165	MN -95e	8:20865
14911	NTIS, PC A03/MF A01	DE83002571	MN -25	8:21074
15029	NTIS, PC A09/MF A01; 1	DE83007204	MN -70	8:19854
15066-Summ.	NTIS, PC A02/MF A01	DE83002557	MN -20d	8:22739
15171	NTIS, PC A17/MF A01	DE83007046	MN -61c	8:20001
15183	NTIS, PC A03/MF A01; 1	DE83008253	MN -95d	8:20906
15238	NTIS, PC A02/MF A01	DE83007043	MN -37	8:21528
15293	NTIS, PC A03/MF A01	DE83006747	MN -25	8:21126
15372	NTIS, PC A02/MF A01	DE83006954	MN -20b	8:21341
15374	NTIS, PC A02/MF A01; 1	DE83006953	MN -95d	8:20907
15469	NTIS, PC A03/MF A01; 1	DE83006968	MN -28	8:22268
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15489	NTIS, PC A02/MF A01; 1	DE83008394	MN -34	8:21075
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15672	NTIS, PC A02/MF A01	DE83008396	MN -20a	8:22625
15685	NTIS, PC A03/MF A01	DE83006967	MN -34C	8:22392
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193	NTIS, PC A07/MF A01			8:22197
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83-03	NTIS, PC A02/MF A01	DE83006931	MN -45	8:21651
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50	NTIS (US Sales Only), PC A02/MF A01	DE83900725	MN -37	8:21217
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82ASE248SA1	*See* DOE/NASA/0032-15	DE83004802	MN -96	8:21021
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3041	NTIS, PC A02/MF A01	DE83008213	STD -4	8:21077
3045	NTIS, PC A02/MF A01	DE83008172	STD -70	8:19855
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83-62-0001	NTIS, PC A02/MF A01	DE83007033	MN -38	8:21652
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11290-1	NTIS, PC A08/MF A01; 1	DE83002272	STD -96	8:20269
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82-14228	NTIS, PC A99/MF A01			8:20002
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2410	NTIS, PC A03/MF A01	DE83006575	MN -4	8:21285
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23856-6	*See* DOE/ET/34203-46	DE83007939	STD -78	8:20326
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24583-1	General Electric Co., Nuclear Engineering Division, San Jose, CA 95125		MN -78	8:20330
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2115	NTIS (US Sales Only), PC A02/MF A01; 1	DE82902528	MN -25	8:21037
2116	NTIS (US Sales Only), PC A03/MF A01; 1	DE82902437	MN -4	8:21218
NMERDI-				
2-69-3304	New Mexico Energy Research and Development Institute, Information Center, 117 Richmond Drive, N.E., Albuquerque, NM 87106		MN -92a	8:19765
2-69-3410	New Mexico Energy Research and Development Inst., 117 Richmond Dr., NE, Albuquerque, NM 87106		MN -91	8:19782
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391355	NTIS (US Sales Only), PC A03/MF A01; 1	DE83901355	MN -34D	8:22269
2902727	Solar Energy Industries Association, 1001 Connecticut Ave., NW, Suite 632, Washington, DC 20036, $8.00		ND -58	8:19966
2902736	NTIS (US Sales Only), PC A08; 3	DE82902736	ND -41	8:21440
3900019	NTIS (US Sales Only), PC A13/MF A01	DE83900019	MN -13	8:21818
3900020	NTIS (US Sales Only), PC A06/MF A01	DE83900020	MN -97d	8:20271
3900021	NTIS (US Sales Only), PC A08/MF A01	DE83900021	MN -97d	8:20272
3900022	NTIS (mf) (US Sales Only).; 2	DE83900022	MN -94a	8:20737
3900023	NTIS (US Sales Only), PC A02/MF A01; 1	DE83900023	MN -60	8:20232
3900024	NTIS (US Sales Only), PC A08/MF A01	DE83900024	MN -90c	8:19531
3900025	NTIS (US Sales Only), PC A06/MF A01	DE83900025	MN -38	8:21425
3900026	NTIS (US Sales Only), PC A09/MF A01	DE83900026	MN -95d	8:20910
3900027	NTIS (US Sales Only), PC A02/MF A01	DE83900027	MN -95	8:20862
3900028	NTIS (US Sales Only), PC A07/MF A01; 1	DE83900028	MN -94c	8:20751
3900029	NTIS (US Sales Only), PC A02/MF A01	DE83900029	MN -95	8:20810
3900143	NTIS (US Sales Only), PC A04/MF A01	DE83900143	MN -13	8:20845
3900158	NTIS (US Sales Only), PC A07/MF A01	DE83900158	MN -61a	8:21931
3900159	NTIS (US Sales Only), PC A03/MF A01	DE83900159	MN -13	8:20793
3900188	NTIS (US Sales Only), PC A02/MF A01	DE83900188	MN -92	8:20811
3900498	NTIS, PC A02/MF A01	DE83900498	MN -98A	8:19656
3900667	NTIS (US Sales Only), MF A01; 2	DE83900667	MN -80	8:20698
3900698	University of Hawaii, Hawaii Natural Energy Inst., Manoa, HI		MN -98D	8:20012

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3900729	NTIS (US Sales Only), PC A03/MF A01	DE83900729	MN -48	8:21898
3900905	NTIS (US Sales Only), PC A02/MF A01; 1		MN -20	8:21399
3901007	NTIS (US Sales Only), PC A07/MF A01	DE83901007	MN -59c	8:20130
3901009	NTIS (US Sales Only), PC A08/MF A01	DE83901009	MN -38	8:21426
3901010	NTIS (US Sales Only), PC A10/MF A01; 1	DE83901010	MN -48	8:21828
3901011	NTIS (US Sales Only), PC A06/MF A01; 1	DE83901011	MN -11	8:22050
3901014	NTIS (US Sales Only), PC A04/MF A01; 1	DE83901014	MN -4	8:21272
3901015	NTIS (US Sales Only), PC A04/MF A01	DE83901015	MN -48	8:22002
3901016	NTIS (US Sales Only), PC A04/MF A01	DE83901016	MN -38	8:21347
3901017	NTIS (US Sales Only), PC A08/MF A01; 1	DE83901017	MN -11	8:21683
3901018	NTIS (mf) (US Sales Only).; 2	DE83901018	MN -92	8:19729
3901019	NTIS (US Sales Only), PC A03/MF A01; 1	DE83901019	MN -61a	8:20013
3901020	NTIS (US Sales Only), PC A07/MF A01; 1	DE83901020	MN -13	8:20801
3901021	NTIS (US Sales Only), PC A08/MF A01	DE83901021	MN -95e	8:20974
3901023	NTIS (US Sales Only), PC A02/MF A01; 1	DE83901023	MN -97b	8:20846
3901024	NTIS (US Sales Only), PC A02/MF A01; 1	DE83901024	MN -97b	8:20847
3901025	NTIS (US Sales Only), PC A02/MF A01; 1	DE83901025	MN -97b	8:20848
3901052	NTIS MF A01		MN -11	8:21892
3901053	NTIS		MN -11	8:21893
3901064	NTIS (US Sales Only), PC A03/MF A01	DE83901064	MN -92	8:19716
3901121	New Mexico Energy R & D Information Center, 117 Richmond Dr., NE, Albuquerque, NM 87106		MN -96	8:20954
3901149	NTIS (US Sales Only), MF A01; 1	DE83901149	MN -59c	8:20100
3901156	National Academy Press, 2101 Constitution Avenue, N.W., Washington, DC 20418		MN -88	8:19591
3901160	National Academy Press, 2101 Constitution Avenue, N.W., Washington, DC 20418		MN -88	8:19599
3901210	New Mexico Energy R & D Information Center, 117 Richmond Dr., NE, Albuquerque, NM 87106		MN -96	8:20955
3901213	Texas Energy and Natural Resources Advisory Council, Energy Policy Div., 200 East 18th St., Austin, TX 78701		MN -98	8:20794
3901233	NTIS (US Sales Only), PC A03/MF A01; 1	DE83901233	MN -60	8:20233
3901249	Colorado Geology Survey, Dept. of Natural Resources, Denver, CO		MN -66g	8:20187
3901251	Colorado Geological Survey, Department of Natural Resources, Denver		MN -66g	8:20188
3901252	Colorado Geology Survey, Dept. of Natural Resources, Denver, CO		MN -66g	8:20189
3901253	Colorado Geological Survey, Dept. of Natural Resources, Denver, CO		MN -66g	8:20190
3901255	Colorado Geological Survey, Dept. of Natural Resources, Denver		MN -66g	8:20191
3901304	NTIS (US Sales Only), PC A17/MF A01; 1		MN -61a	8:20014
3901368	CALTECH, California Inst. of Tech., 1201 East California Boulevard, Pasadena 91125		MN -38	8:21303
3901496	Bureau of Mines, Washington, DC		MN -88	8:19659
3901549	NTIS, PC A03/MF A01	DE83901549	MN -64	8:20074
3901550	NTIS, PC A03/MF A01	DE83901550	MN -64	8:20075
3901551	Ohio State Univ., Agricultural Research and Development Center, Columbus, OH 43210		MN -61a	8:20015
3901553	Public Service Company of Colorado, 2420 W. 26th Ave., Suite 100D, Denver, CO 80211		MN -77	8:20623
3901554	Office of Ocean Minerals and Energy, National Oceanic and Atmospheric Administration, Washington, DC 20235		MN -64	8:20076
3901555	Dept. of Commerce, National Oceanic and Atmospheric Administration, Office of Ocean Minerals and Energy, Washington, DC 20235		MN -64	8:20077
3901572	NTIS, PC A06/MF A01; 1	DE83901572	MN -66g	8:20192
3901666	NTIS, PC A04/MF A01; 1	DE83901666	MN -98F	8:20849
3901667	NTIS, PC A03/MF A01; 1	DE83901667	MN -95f	8:20850
3901668	NTIS, PC A05/MF A01	DE83901668	MN -98F	8:20851
3901671	NTIS, PC A14/MF A01; 1	DE83901671	MN -98G	8:20802
3901689	NTIS, PC A04/MF A01; 1	DE83901689	MN -98F	8:21889
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936	*See* DOE/ER/40016-T1	DE83000719	MN -34C	8:22344
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61-82-004	*See* AD-A-115428/5			8:21856
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4766	*See* AD-A-115462/4			8:21465
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5003	NTIS, PC A03/MF A01	DE83007231	MN -21	8:22741
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973	*See* AD-A-115053/1			8:21988
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0020-Vol.6-No.10	NTIS, PC A18/MF A01 - GPO	DE83901522	MN -80	8:20450
0090-V4-N4	NTIS, PC A03/MF A01			8:20699
0304-V7-N1	NTIS, PC A07/MF A01			8:20451
0383-Vol.1-Rev.5	NTIS, PC A18/MF A01; 1 - GPO $9.50	DE83901461	MN -71	8:19808
0383-Vol.2-Rev.5	NTIS, PC A99/MF A01; 1 - GPO $12.00	DE83901510	MN -71	8:19809

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0383-Vol.3-Rev.2	NTIS, PC A07/MF A01 - GPO $6.00	DE83901532	MN -71	8:19810
0430-Vol.3-No.1	NTIS, PC A02/MF A01 - GPO	DE83901536	MN -15	8:19896
0485-V4-N4	NTIS, PC A05/MF A01			8:20700
0485-Vol.5-No.1	NTIS, PC A04/MF A01; 1 - GPO	DE83901535	MN -80	8:20452
0540-N2	NTIS, PC A18/MF A01			8:20453
0540-Vol.4-No.11	NTIS, PC A99/MF A01; 1 - GPO	DE83901541	MN -80	8:20454
0566-Vol.2-No.4	NTIS, PC A09/MF A01 - GPO	DE83901520	MN -80	8:20455
0606-Vol.5-No.1	NTIS, PC A05/MF A01 - GPO	DE83901547	MN -80	8:20701
0725-REV-2	NTIS, PC A05/MF A01			8:19811
0748-V2-N3	NTIS, PC A16/MF A01			8:20456
0748-Vol.2-No.12	NTIS, PC A13/MF A01 - GPO; 1	DE83901271	MN -80	8:20457
0748-Vol.3-No.1	NTIS, PC A13/MF A01; 1 - GPO	DE83901513	MN -80	8:20458
0750-V14-IND-1	NTIS, PC A04/MF A01			8:20459
0750-V15-N1	NTIS, PC A11/MF A01			8:20460
0750-V15-N2	NTIS, PC A07/MF A01			8:20461
0825	NTIS, PC A23/MF A01; 1 - GPO $12.00	DE83901543	MN -78	8:20702
0837-V1-N3-N4	NTIS, PC A09/MF A01			8:21806
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0845	NTIS- GPO $8.50	DE83901540	MN -15	8:20703
0849	NTIS, PC A03/MF A01			8:20462
0868	NTIS, PC A13/MF A01			8:21874
0891	NTIS, PC A07/MF A01			8:20704
0923	NTIS, PC A02/MF A01			8:19812
0943	NTIS, PC A03/MF A01 - GPO $4.50	DE83901544	MN -78	8:20331
0959	NTIS, PC A07/MF A01; 1 - GPO $6.00	DE83901490	MN -70	8:19882
0963	NTIS, PC A05/MF A01 - GPO $5.50	DE83901519	MN -80	8:20705
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0034-Vol.1	NTIS, PC A23/MF A01 - GPO $12.00	DE82906283	MN -80	8:20554
0036	NTIS, PC A13/MF A01; 1 - GPO	DE83003875	MN -80	8:20574
0039	NTIS, PC A99/MF A01; 1	DE83900961	MN -41	8:20709
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1582-Vol.1	NTIS, PC A03/MF A01 - GPO	DE83008594	MN -11	8:20712
2000-Vol.2-No.1	NTIS, PC A06/MF A01 - GPO	DE83007893	MN -80	8:20463
2334	NTIS, PC A10/MF A01			8:20713
2394	NTIS PC E06/MF $4.75; 1 - GPO $7.00	DE83007228	MN -70	8:19883
2401	NTIS, PC A18/MF A01; 1 - GPO	DE83901508	MN -78	8:20714
2443	NTIS, PC A11/MF A01 - GPO $7.50	DE83901456	MN -11	8:20289
2518	NTIS, PC A04/MF A01			8:20273
2584	NTIS, PC A02/MF A01			8:21802
2618	NTIS PC E06/MF A01; 1 - GPO	DE83007981	MN -78	8:20715
2637	NTIS, PC A03/MF A01			8:21803
2659	NTIS (US Sales Only), PC A04/MF A01 - GPO $5.00	DE83008319	MN -78	8:20716
2675	NTIS, PC A04/MF A01 - GPO $4.75	DE83007188	MN -70B	8:19884
2680-Rev.1	NTIS, PC A06/MF A01; 1 - GPO	DE83007347	MN -15	8:20717
2700	NTIS, PC A05/MF A01			8:19856
2703	NTIS, PC A05/MF A01; 1 - GPO $5.50	DE83901509	MN -78	8:20344
2704	NTIS, PC A05/MF A01			8:20478
2727-V1	NTIS, PC A03/MF A01			8:21876
2800	NTIS, PC A12/MF A01; 1 - GPO $8.00	DE83008244	MN -80	8:20718
2805-Vol.2	NTIS, PC A04/MF A01; 1 - GPO $4.75	DE83007395	MN -78	8:20345
2805-Vol.3	NTIS, PC A08/MF A01; 1 - GPO $6.50	DE83007339	MN -78	8:20346
2809-Vol.3	NTIS, PC A03/MF A01; 1 - GPO	DE83008030	MN -80	8:20719
2849	NTIS, PC A04/MF A01; 1 - GPO $5.00	DE83007959	MN -73	8:20720
2878	NTIS, PC A03/MF A01 - GPO $4.50	DE83008557	MN -78	8:20594
2891	NTIS, PC A08/MF A01; 1 - GPO $6.50	DE83901542	MN -41	8:22540
2892	NTIS, PC A10/MF A01; 1 - GPO $7.50	DE83901539	MN -41	8:22541
2929	NTIS, PC A03/MF A01 - GPO $4.75	DE83007941	MN -77	8:20403
2935	NTIS, PC A13/MF A01; 1 - GPO $8.50	DE83007534	MN -15	8:19897
2952	NTIS, PC A03/MF A01 - GPO $4.50	DE83008250	MN -80	8:20316
2993	NTIS, PC A03/MF A01; 1 - GPO $3.75	DE83008254	MN -78	8:20382
3028	NTIS, PC A18/MF A01; 1 - GPO $9.50	DE83008246	MN -78	8:20721
3032	NTIS, PC A04/MF A01	DE83007771	MN -70	8:19885
3069-Vol.1	NTIS, PC A03/MF A01; 1 - GPO $4.75	DE83007880	MN -80	8:20722
3069-Vol.2	NTIS, PC A18/MF A01; 1 - GPO $11.00	DE83007881	MN -80	8:20723
3079	NTIS, PC A05/MF A01; 1 - GPO $5.00	DE83901345	MN -11	8:22051
3103	NTIS, PC A03/MF A01; 1 - GPO	DE83007882	MN -80	8:20620
3106	NTIS, PC A03/MF A01 - GPO $4.50	DE83007572	MN -41	8:21745
3108	NTIS, PC A05/MF A01 - GPO $5.50; 1	DE83007381	MN -80	8:20347
3109	NTIS, PC A07/MF A01; 1 - GPO $5.50	DE83901537	MN -11	8:22052
3120	NTIS, PC A04/MF A01 - GPO $5.00	DE83901533	MN -41	8:19892
3126	NTIS, PC A04/MF A01	DE83007847	MN -78	8:20724
NYSERDA-				
81-22	New York State Energy Research and Development Authority, Two Rockefeller Plaza, Albany, NY 12223		MN -60	8:20204
81-22(A)	New York State Energy Research and Development Authority, Two Rockefeller Plaza, Albany, NY 12223		MN -60	8:20208
81-30	New York State Energy Research and Development Authority, Two Rockefeller Plaza, Albany, NY 12223		MN -95d	8:21001
82-7	*See* ORNL/Sub-9001/1	DE83002729	MN -95d	8:20914
82-24	New York State Energy Research and Development Authority, Two Rockefeller Plaza, Albany, NY 12223		MN -61a	8:21002
82-26	NTIS, PC A05/MF A01; 1	DE83008255	MN -95d	8:20911
82-29	New York State Energy Research and Development Authority, Two Rockerfeller Plaza, Albany, NY 12223		MN -96	8:20016

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OA-tr-				
2543	NTIS (US Sales Only), PC A02/MF A01	DE83900469	MN -13	8:20315
OAQPS-				
1.2-068	*See* PB-82-240615			8:21821
1.2-075	*See* PB-82-244005			8:21769
OCS-				
76	Dept. of the Interior, Minerals Management Service, 18th & C Streets, NW, Washington, DC 20240		MN -98B	8:19730
ONERA-NT-				
1981-8	NTIS, PC A04/MF A01			8:21628
ONI-				
3	NTIS, PC A04/MF A01; 1	DE83004872	MN -70	8:19857
ONWI-				
9(82-3)	NTIS, PC A10/MF A01; 1	DE83007304	MN -70	8:19858
102-Vol.1	NTIS, PC A09/MF A01; 1	DE83007219	MN -70	8:19859
102-Vol.2	NTIS, PC A14/MF A01; 1	DE83007215	MN -70	8:19860
355	NTIS, PC A06/MF A01; 1	DE83008119	MN -70	8:22063
356	NTIS, PC A05/MF A01; 1	DE83008126	MN -70	8:22034
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208	NTIS, PC A03/MF A01	DE83007708	MN -48	8:21914
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83-1(M)	NTIS, PC A02/MF A01	DE83008212	MN -92b	8:19759
ORI-TR-				
1974	*See* AD-A-116138/9			8:20941
ORNL-				
5898	NTIS, PC A03/MF A01	DE83008141	MN -97a	8:20309
5931-Vol.1	NTIS, PC A10/MF A01; 1	DE83007174	STD -37	8:21565
ORNL/CON-				
120	NTIS, PC A03/MF A01	DE83008138	MN -95d	8:20912
121	NTIS, PC A07/MF A01	DE83008304	MN -95	8:20913
ORNL/EIS-				
163-Vol.5-Pt.1	NTIS MF A01; 2	DE83006367	MN -48	8:21899
163-Vol.5-Pt.2	NTIS, PC A21/MF A01; 1	DE83006369	MN -48	8:21900
196-Vol.2	*See* EPA-560/5-82-004	DE83006368	MN -48	8:21827
ORNL/MIT-				
347	NTIS, PC A05/MF A01; 1	DE83007178	MN -13	8:21450
ORNL/NSIC-				
200-Vol.2-No.1	*See* NUREG/CR-2000-Vol.2-No.1	DE83007893	MN -80	8:20463
ORNL/Sub-				
81-1012/ 2	NTIS, PC A18/MF A01; 1	DE83007173	STD -86	8:21232
82-22268/ 1	NTIS, PC A09/MF A01; 1	DE83007179	MN -13	8:21890
7468-13-Vol.1	NTIS, PC A14/MF A01; 1	DE83006838	MN -97c	8:20624
7676/ 3	NTIS, PC A06/MF A01	DE83007883	MN -20b	8:22627
7846/ 2	NTIS, PC A07/MF A01; 1	DE83006351	MN -97c	8:20625
7846/ 3	NTIS, PC A05/MF A01; 1	DE83006352	MN -97c	8:20626
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9001/ 1	NTIS, PC A09/MF A01	DE83002729	MN -95d	8:20914
ORNL/TM-				
6830	NTIS, PC A05/MF A01; 1	DE83008170	MN -95d	8:21003
6830/ P7	NTIS PC E03/MF A01	DE83008171	MN -95d	8:21004
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8310	NTIS, PC A06/MF A01	DE83008306	MN -13	8:20778
8397-Vol.3	*See* NUREG/CR-2809-Vol.3	DE83008030	MN -80	8:20719
8484	NTIS, PC A02/MF A01	DE83008137	STD -97b	8:20310
8510	NTIS, PC A03/MF A01; 1	DE83008169	STD -97d	8:20852
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8554	NTIS, PC A03/MF A01; 1		STD -79	8:20725
8603	NTIS, PC A04/MF A01; 1	DE83008313	STD -12	8:21813
8644	NTIS, PC A03/MF A01	DE83008139	MN -80	8:20648
8677	NTIS, PC A02/MF A01	DE83008305	MN -80	8:20650
ORNL-tr-				
4958	NTIS, PC A02/MF A01; 1	DE83006739	MN -97	8:20286
4960	NTIS, PC A05/MF AO1; 1	DE83007240	MN -78	8:20733
P-				
82/ 13	TNO, P.O. Box 217, Delft, Netherlands			8:19643
102-82-002	California Energy Commission, 1516 Ninth Street, Sacramento, CA		MN -98B	8:19717
105-82-005	California Energy Commission, 1516 Ninth Street, Sacramento, CA 95814		MN -98F	8:20795
110-82-003	California Energy Commission, 1516 Ninth Street, Sacramento, CA		MN -97	8:20853
400-81-022	California Energy Commission, 1516 Ninth Street, Sacramento, CA 95814		MN -95d	8:20915
PATENTS-US-	(US: Commissioner of Patents, Washington, D.C. 20231, USA, $1.00 per copy. Government Patent Applications available from NTIS)			
A6-356,569			MN -79e	8:20445
4,342,816				8:20890
4,343,059				8:21359
4,343,763				8:20596
4,343,764				8:20621
4,343,964				8:20314

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4,344,914				8:20614
4,344,915				8:20615
4,345,173				8:20883
4,345,194				8:20991
4,362,023				8:21358
4,362,564				8:21093
4,362,582				8:21094
4,362,660				8:19803
4,362,692				8:20595
4,362,696				8:20440
4,363,776				8:22649
4,364,029				8:21448
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4,364,269				8:19741
4,364,508				8:20026
4,364,898				8:21293
4,364,906				8:19798
4,365,229				8:20990
4,365,282				8:20284
4,365,301				8:21092
4,366,112				8:22753
4,366,116				8:20613
4,366,379				8:19797
4,367,657				8:21634
4,368,996				8:21633
A 6-354,553		DE83006854	MN -25	8:19900
A 6-360,116		DE83006873	MN -25	8:19875
A 6-361,932		DE83006878	MN -38	8:21109
A 6-363367				8:19796
A 6-364,282		DE83006888	MN -25	8:21108
A 6-368,197		DE83006890	MN -91	8:19783
A 6-368,473				8:21611
A 6-372,861		DE83006900	MN -90d	8:19536
A 6-381,099				8:21610
A 6-386465				8:19930
A 6-403,439				8:21404
A 6-403,458				8:21403
PB-				
80-157217	NTIS		ND -11	8:22003
80-167034	NTIS		ND -11	8:21829
81-179376	NTIS		ND -11	8:21746
81-200800	NTIS		ND -11	8:21747
81-202673	NTIS		ND -11	8:21748
81-235053	NTIS, PC A03/MF A01			8:20131
81-245839	NTIS, PC A06/MF A01			8:19532
81-249724	NTIS, PC A06/MF A01			8:22053
82-100074	NTIS, PC AMF A01			8:21749
82-106501	NTIS, PC AMF A01			8:21750
82-106527	NTIS, PC AMF A01			8:21751
82-196403	NTIS, PC A12/MF A01			8:22004
82-203324	NTIS, PC AE04/MF E04			8:21082
82-205212	NTIS, PC A03/MF A01			8:20916
82-206715	NTIS, PC A04/MF A01			8:19640
82-206905	NTIS, PC A03/MF A01			8:20311
82-206962	NTIS, PC A05/MF A01			8:21886
82-208463	NTIS, PC A02/MF A01			8:22372
82-208562	NTIS, PC A03/MF A01			8:19657
82-208794	NTIS, PC A11/MF A01			8:19962
82-209776	NTIS, PC A04/MF A01			8:20312
82-211236	Pub. in Proceedings of a Meeting on Traceability for Ionizing Radiation Measurements, Gaithersburg, Maryland, May 8-9, 1980, p171-178 Feb 82.			8:21966
82-213729	NTIS, PC A04/MF A01			8:20017
82-213778	NTIS, PC A04/MF A01			8:20993
82-214008	NTIS, PC A14/MF A01			8:21844
82-214016	NTIS, PC A16/MF A01			8:21845
82-214032	NTIS, PC A99/MF A01			8:21846
82-214057	NTIS, PC A10/MF A01			8:21847
82-214784	NTIS, PC A02/MF A01			8:19660
82-214792	NTIS, PC A02/MF A01			8:19661
82-215419	NTIS, PC A04/MF A01			8:20313
82-215450	NTIS, PC A06/MF A01			8:21348
82-217019	NTIS, PC A02/MF A01			8:20940
82-217530	NTIS, PC A03/MF A01			8:21752
82-217597	NTIS PC E06/MF E06			8:22876
82-217605	NTIS PC E04/MF E04			8:20796
82-217621	NTIS PC E07/MF E07			8:19957
82-217639	NTIS, PC AE06/MF E06			8:20274
82-217654	NTIS PC E04/MF E04			8:19766
82-218488	NTIS, PC A02/MF A01			8:21006
82-218660	NTIS, PC A06/MF A01			8:19662
82-219031	NTIS, PC A08/MF A01			8:21753
82-219262	NTIS PC E07/MF E07			8:20797
82-219353	NTIS, PC A11/MF A01			8:20290
82-219361	NTIS, PC A16/MF A01			8:20291

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82-219437	NTIS, PC A16/MF A01			8:21830
82-220559	NTIS, PC A06/MF A01			8:19749
82-220575	NTIS, PC A05/MF A01			8:20917
82-221433	NTIS, PC AE05/MF E05			8:20143
82-221714	NTIS, PC AE03/MF E03			8:20767
82-222910	NTIS, PC A06/MF A01			8:19600
82-222936	NTIS, PC A09/MF A01			8:19601
82-224304	NTIS, PC A10/MF A01			8:22159
82-224312	NTIS, PC A10/MF A01			8:22160
82-224643	NTIS, PC A02/MF A01			8:21754
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82-225046	NTIS, PC A06/MF A01			8:20628
82-225061	NTIS, PC A03/MF A01			8:21755
82-225590	NTIS, PC A13/MF A01			8:22161
82-225855	NTIS, PC A04			8:19602
82-225996	NTIS, PC A05/MF A01			8:19718
82-226465	NTIS, PC A08/MF A01			8:21756
82-226473	NTIS, PC A08/MF A01			8:21757
82-226895	NTIS, PC A02/MF A01			8:21529
82-226903	NTIS, PC A02/MF A01			8:22204
82-227042	NTIS, PC A03/MF A01			8:19861
82-227117	NTIS, PC A05/MF A01			8:21758
82-227208	NTIS, PC AE04/MF E04			8:20768
82-227265	NTIS, PC A08/MF A01			8:20293
82-227273	NTIS, PC A09/MF A01			8:20294
82-227281	NTIS, PC A07/MF A01			8:20295
82-227356	NTIS, PC A09/MF A01			8:21466
82-227596	NTIS, PC A11/MF A01			8:20975
82-227604	NTIS, PC A07/MF A01			8:19760
82-227612	NTIS, PC A04/MF A01			8:19915
82-227646	NTIS, PC A06/MF A01			8:19762
82-227653	NTIS, PC A04/MF A01			8:19677
82-227661	NTIS, PC A03/MF A01			8:20918
82-227679	NTIS, PC A04/MF A01			8:19772
82-227695	NTIS, PC A11/MF A01			8:21759
82-227729	NTIS, PC A07/MF A01			8:19592
82-227810	NTIS, PC A11/MF A01			8:19687
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82-229634	NTIS, PC A10/MF A01			8:20919
82-229667	NTIS, PC A05/MF A01			8:21456
82-229725	NTIS, PC A08/MF A01			8:20275
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82-229758	NTIS, PC A08/MF A01			8:21457
82-229766	NTIS, PC A08/MF A01			8:21458
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82-230376	NTIS, PC A06/MF A01			8:21014
82-230459	NTIS, PC A07/MF A01			8:20779
82-230616	NTIS, PC A08/MF A01			8:20296
82-230715	NTIS, PC A19/MF A01			8:21459
82-230731	NTIS, PC AE05/MF E05			8:20978
82-230772	NTIS, PC A05/MF A01			8:21879
82-230780	NTIS, PC A06/MF A01			8:21880
82-230905	NTIS, PC A08/MF A01			8:20276
82-230954	NTIS, PC A23/MF A01			8:19673
82-231077	NTIS, PC A17/MF A01			8:21460
82-231085	NTIS, PC A09/MF A01			8:21461
82-231093	NTIS, PC A10/MF A01			8:21462
82-231150	NTIS, PC A16/MF A01			8:20297
82-231168	NTIS, PC A09/MF A01			8:20921
82-231176	NTIS, PC A05/MF A01			8:20922
82-231267	NTIS, PC A06/MF A01			8:20298
82-231275	NTIS, PC A18/MF A01			8:20299
82-231283	NTIS, PC A16/MF A01			8:20300
82-231416	NTIS, PC A18/MF A01			8:19731
82-231622	NTIS, PC A15/MF A01			8:19916
82-231648	NTIS, PC A04/MF A01			8:19751
82-231655	NTIS, PC A07/MF A01			8:19752
82-231671	NTIS, PC A15/MF A01			8:19917
82-231838	NTIS, PC A09/MF A01			8:19720
82-232067	NTIS, PC A08/MF A01			8:21761
82-232331	NTIS, PC A03/MF A01			8:20738
82-232372	NTIS, PC A10/MF A01			8:20277
82-232380	NTIS, PC A14/MF A01			8:19641
82-232448	NTIS, PC A04/MF A01			8:21762
82-232513	NTIS, PC A11/MF A01			8:20979
82-232786	NTIS, PC AE03/MF E03			8:19918
82-232919	NTIS, PC A03/MF A01			8:20734
82-233909	NTIS, PC A02/MF A01			8:19688
82-234147	NTIS, PC A09/MF A01			8:21763
82-234618	NTIS, PC A03/MF A01			8:20301

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82-235854	NTIS, PC A05/MF A01			8:21015
82-236266	NTIS, PC A03/MF A01			8:19678
82-236563	NTIS, PC A03/MF A01			8:21584
82-236670	NTIS, PC A07/MF A01			8:20630
82-236860	Pub. in Proceedings of IAEA Consultants' Meeting on Neutron Source Properties, Kossuth Lajon University, Debrecen, Hungary, March 17-21, 1980, p119-134 1980.			8:22521
82-236936	NTIS, PC A11/MF A01			8:19784
82-236969	NTIS, PC A06/MF A01			8:19976
82-237025	NTIS, PC A12/MF A01			8:20278
82-237041	NTIS, PC A09/MF A01			8:19950
82-237199	NTIS, PC A02/MF A01			8:21881
82-237371	NTIS, PC A09/MF A01			8:20302
82-237389	NTIS, PC A08/MF A01			8:20303
82-237421	NTIS, PC A15/MF A01			8:20780
82-238130	NTIS, PC A06/MF A01			8:20735
82-238262	NTIS, PC A05/MF A01			8:20939
82-238296	NTIS, PC A04/MF A01			8:19689
82-238452	NTIS, PC A03/MF A01			8:21300
82-238536	NTIS, PC A03/MF A01			8:20786
82-238544	NTIS, PC A20/MF A01			8:20787
82-238676	NTIS, PC A16/MF A01			8:20775
82-239716	NTIS, PC A13/MF A01			8:21882
82-239732	NTIS, PC A04/MF A01			8:19622
82-239757	NTIS, PC A03/MF A01			8:19690
82-239773	NTIS, PC A03/MF A01			8:19740
82-239997	NTIS, PC A02/MF A01			8:19569
82-240011	NTIS, PC A04/MF A01			8:21219
82-240045	NTIS, PC A04/MF A01			8:20803
82-240086	NTIS, PC A06/MF A01			8:20304
82-240185	NTIS, PC A04/MF A01			8:21463
82-240318	NTIS, PC A03/MF A01			8:21819
82-240326	NTIS, PC A02/MF A01			8:21820
82-240508	NTIS, PC A03/MF A01			8:20992
82-240615	NTIS, PC A03/MF A01			8:21821
82-240714	NTIS, PC A99/MF A01			8:21764
82-240797	NTIS, PC A02/MF A01			8:21765
82-241415	NTIS, PC A03/MF A01			8:19570
82-241605	NTIS, PC A09/MF A01			8:20279
82-241613	NTIS, PC A08/MF A01			8:21822
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82-244005	NTIS, PC A02/MF A01			8:21769
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82-249889	NTIS, PC A04/MF A01			8:19787
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82-257650	NTIS, PC A05/MF A01			8:20306
82-258062	NTIS, PC A06/MF A01			8:21986
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82-258591	NTIS, PC A11/MF A01			8:22006
82-259631	NTIS, PC A08/MF A01			8:20982
82-260019	NTIS, PC A05/MF A01			8:21028
82-260415	NTIS, PC A04/MF A01			8:21007
82-260811	NTIS, PC A03/MF A01			8:20923
82-260985	NTIS, PC A02/MF A01			8:20167
82-262296	NTIS, PC A05/MF A01			8:20924
82-262783	NTIS, PC A02/MF A01			8:20983
82-262957	NTIS, PC A04/MF A01			8:20925
82-266271	NTIS, PC A03/MF A01			8:20926
82-903604	*See* DOE/TIC/EGC-82/4		ND -13	8:20754
82-927905	NTIS PC E02			8:21848
83-100479	NTIS, PC A05/MF A01			8:20927
83-101139	NTIS, PC A12/MF A01			8:21017
83-101147	NTIS, PC A05/MF A01			8:21018
83-101154	NTIS, PC A09/MF A01			8:21019
83-101907	NTIS, PC A05/MF A01			8:20928
83-103523	NTIS, PC A03/MF A01			8:21349

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83-104042	NTIS, PC A05/MF A01			8:19862
83-105387	NTIS, PC A05/MF A01			8:21887
83-107813	NTIS, PC A05/MF A01			8:21301
83-108605	NTIS, PC A03/MF A01			8:20984
83-110734	NTIS, PC A02/MF A01			8:20985
83-111088	NTIS, PC A02/MF A01			8:19936
83-111286	NTIS, PC A02/MF A01			8:20986
83-111443	NTIS, PC A02/MF A01			8:20200
83-112557	NTIS, PC A03/MF A01			8:21586
83-112789	NTIS, PC A04/MF A01			8:21020
83-114165	NTIS, PC A05/MF A01			8:19734
83-114173	NTIS, PC A05/MF A01			8:19774
83-114538	NTIS, PC A03/MF A01			8:19735
83-114702	NTIS PC E03/MF E03			8:21804
83-114736	NTIS, PC A03/MF A01			8:21770
83-114868	NTIS, PC A10/MF A01			8:19893
83-114884	NTIS, PC A10/MF A01			8:19604
83-114942	NTIS, PC A10/MF A01			8:20281
83-115378	NTIS, PC A10/MF A01			8:20958
83-115386	NTIS, PC A12/MF A01			8:20959
83-115600	NTIS, PC A03/MF A01			8:21771
83-115840	NTIS, PC A05/MF A01			8:19611
83-116830	NTIS, PC A09/MF A01			8:21033
83-117069	NTIS, PC A02/MF A01			8:19748
83-117317	NTIS, PC A08/MF A01			8:20929
83-117358	NTIS, PC A04/MF A01			8:20987
83-117382	NTIS, PC A12/MF A01			8:20930
83-117804	NTIS, PC A99/MF E08			8:20307
83-117887	NTIS, PC A08/MF A01			8:19612
83-117911	NTIS, PC A03/MF A01			8:21772
83-118026	NTIS, PC A04/MF A01			8:21863
83-118323	NTIS, PC A04/MF A01			8:19951
83-118646	NTIS, PC A04/MF A01			8:20931
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83-122978	NTIS, PC A13/MF A01			8:20933
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83-124347	NTIS, PC A12/MF A01			8:20935
83-124370	NTIS, PC A16/MF A01			8:20936
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83-131037	NTIS, PC A02/MF A01			8:19664
83-135509	NTIS, PC A08/MF A01			8:19624
83-135707	NTIS PC E99/MF E99			8:21967
83-137224	NTIS, PC A02/MF A01			8:22007
83-137265	NTIS, PC A18/MF A01			8:19665
83-137372	NTIS, PC A12/MF A01			8:21968
83-138768	NTIS, PC A04/MF A01			8:22024
83-139246	Pub. in Proceedings of IAEA Symposium, National and International Standardization of Radiation Dosimetry, Atlanta, GA., Dec 77, II, p147-154 1978.			8:22542
83-139295	NTIS, PC A07/MF A01			8:19666
83-139576	NTIS, PC A02/MF A01			8:22025
83-935500	Paper copy available on subscription, North American Continent price, $30.00/year; all others write for quote. Also available in single copies.			8:21969
83-938200	Paper copy available on subscription, North American Continent price, $30.00/year; all others write for quote. Also available in single copies.			8:21915
83-938300	Paper copy available on subscription, North American Continent price, $30.00/year; all others write for quote. Also available in single copies.			8:21916
83-939000	Paper copy available on subscription, North American Continent price, $30.00/year; all others write for quote. Also available in single copies.			8:21917
83-939100	Paper copy available on subscription, North American Continent price, $30.00/year; all others write for quote. Also available in single copies.			8:21918
285174	NTIS		ND -11	8:21773
80132004	NTIS		ND -11	8:21864
PML-				
1979-41	NTIS, PC A03/MF A01			8:19736
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PNL-				
3794	*See* NUREG/CR-2659	DE83008319	MN -78	8:20716
4118	NTIS, PC A03/MF A01; 1	DE83008163	MN -46	8:21350
4241-Vol.3	*See* NUREG/CR-2675	DE83007188	MN -70B	8:19884
4297	*See* NUREG/CR-2800	DE83008244	MN -80	8:20718
4336	*See* NUREG/CR-2935	DE83007534	MN -15	8:19897
4373	*See* NUREG/CR-2878	DE83008557	MN -78	8:20594
4449	*See* NUREG/CR-2929	DE83007941	MN -77	8:20403
4468	*See* NUREG/CR-2952	DE83008250	MN -80	8:20316
4485	*See* DOE/ET/34215-31	DE83007205	STD -78	8:20327
4499	NTIS, PC A06/MF A01; 1	DE83008124	MN -95f	8:20988
4555	NTIS, PC A03/MF A01; 1	DE83007866	MN -85	8:19813
4562	NTIS, PC A05/MF A01; 1	DE83008203	MN -11	8:22054

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4587	NTIS, PC A04/MF A01	DE83006700	MN -94e	8:20739
4591	*See* NUREG/CR-3106	DE83007572	MN -41	8:21745
4592	NTIS, PC A04/MF A01; 1	DE83007253	STD -95f	8:20989
4593	NTIS, PC A04/MF A01	DE83007801	MN -11	8:20018
4599	NTIS MF A01; 2	DE83007992	MN -11	8:21774
PNL-SA-				
8737	NTIS, PC A02/MF A01	DE83002695	MN -70	8:21165
8907	NTIS, PC A02/MF A01	DE83003464	MN -95c	8:20193
9287	NTIS, PC A02/MF A01; 3	DE82012860	ND -20c	8:21083
10409	NTIS, PC A03/MF A01; 1	DE83007053	MN -79p	8:20726
10480	NTIS, PC A04/MF A01; 1	DE83007076	MN -11	8:21775
10481	NTIS, PC A02/MF A01; 1	DE83007082	MN -11	8:21776
10533	NTIS, PC A02/MF A01; 1	DE83007844	MN -11	8:21865
10557	NTIS, PC A02/MF A01	DE83007045	MN -79p	8:20727
10634	NTIS, PC A02/MF A01	DE83007851	MN -11	8:21684
10638	NTIS, PC A02/MF A01; 1	DE83007841	MN -41	8:21587
10653	NTIS, PC A03/MF A01; 1	DE83007044	MN -60	8:20234
10656-A	NTIS, PC A02/MF A01; 1	DE83007846	MN -41	8:21588
10670	NTIS, PC A02/MF A01; 1	DE83007845	MN -37	8:21589
10696	NTIS, PC A02/MF A01; 1	DE83007842	MN -41	8:19894
10714	NTIS, PC A11/MF A01; 1	DE83006605	MN -41	8:22543
10833	NTIS, PC A03/MF A01	DE83007052	MN -41	8:20728
10869	NTIS, PC A02/MF A01	DE83006939	MN -90d	8:19667
10890	NTIS, PC A02/MF A01; 1	DE83007051	MN -60	8:20235
11039	NTIS, PC A03/MF A01	DE83008024	MN -61a	8:20019
11106	NTIS, PC A02/MF A01	DE83007077	MN -41	8:21971
11110	NTIS, PC A02/MF A01	DE83007843	MN -48	8:22008
11128	NTIS, PC A02/MF A01	DE83006615	MN -94a	8:20740
PP-				
60-19	Office of Personnel Management Compensation Group, Office of Compensation Program Development, 1900 E Street, NW, Washington, DC 20415		MN -13	8:22826
PSR-				
1027	*See* AD-A-115024/2			8:22036
R-				
83-915729-24	*See* DOE/PC/40280-T7	DE83007080	MN -90h	8:19636
RAND/N-				
1788-RC	*See* N-8228782			8:20073
1798-DOE	*See* N-8228697			8:19780
1798-DOE	NTIS, PC A03/MF A01	DE83008185	MN -91	8:19788
REPT-				
81-139	NTIS, PC A04/MF A01			8:22742
482-DT-4	NTIS, PC A07/MF A01			8:21629
RFP-				
3311	NTIS, PC A06/MF A01; 1	DE83007465	STD -4	8:19802
3329	NTIS, PC A02/MF A01	DE83006740	MN -38	8:21084
3383	NTIS, PC A10/MF A01; 1	DE83007202	STD -60	8:20236
3386	NTIS, PC A04/MF A01	DE83007195	STD -60	8:20205
3448	NTIS, PC A05/MF A01; 1	DE83008769	MN -60	8:20209
3449	NTIS, PC A04/MF A01; 1	DE83007198	STD -60	8:20237
3486	NTIS, PC A03/MF A01	DE83007537	MN -25	8:21085
3492	NTIS, PC A02/MF A01; 1	DE83007536	MN -10	8:19863
RHO-BW-SR-				
82-2-2Q-P	NTIS, PC A03/MF A01	DE83007947	MN -70	8:19864
82-2-3Q-P	NTIS, PC A04/MF A01	DE83008195	MN -70	8:19865
RHO-BW-ST-				
35P	NTIS, PC A04/MF A01	DE83008062	MN -70	8:19887
RHO-BWI-LD-				
9	NTIS, PC A06/MF A01	DE83007027	MN -70	8:22035
RL-				
82-016	*See* PB-82-208463			8:22372
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36	*See* PB-82-239732			8:19622
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3360	Royal Signals and Radar Establishment, Malvern, England			8:21086
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2265/ 00/ 04F	*See* AD-A-119825/8			8:22896
SAND-				
79-0269	NTIS, PC A08/MF A01; 1	DE83008481	MN -70	8:19866
79-1623(Rev.)	NTIS, PC A06/MF A01; 1	DE83006847	MN -32	8:21427
80-2517	NTIS, PC A04/MF A01; 1	DE83007587	MN -71	8:19814
81-1795C	NTIS, PC A02; 3	DE82006298	ND -66	8:20182
81-2029	NTIS, PC A02/MF A01	DE83006390	MN -37	8:21351
81-2377	*See* NUREG/CR-2394	DE83007228	MN -70	8:19883
82-0053	NTIS, PC A05; 3	DE82011679	ND -13	8:21352
82-0282C	NTIS, PC A02/MF A01	DE82010080	MN -92a	8:19767
82-0599	NTIS, PC A03/MF A01	DE83007316	MN -13	8:21464
82-0793	NTIS, PC A04/MF A01	DE83007469	MN -13	8:19867
82-0809	NTIS, PC A04/MF A01; 1	DE83007407	MN -32	8:21353
82-1616	NTIS, PC A03/MF A01; 1	DE83007580	MN -66c	8:20183
82-1790C	NTIS, PC A02/MF A01; 1	DE83002518	MN -63c	8:20046
82-1907C	NTIS, PC A02/MF A01; 1	DE83006398	MN -25	8:22558
82-1970C	NTIS, PC A02/MF A01; 1	DE83008183	MN -62a	8:20132
82-2002C	NTIS, PC A08/MF A01; 1	DE83007368	MN -51	8:21639

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82-2264C	*See* NUREG/CP-0036	DE83003875	MN -80	8:20574
82-2413C	NTIS, PC A02/MF A01; 1	DE83006204	MN -70	8:19868
82-2738/ 1	*See* NUREG/CR-3069-Vol.1	DE83007880	MN -80	8:20722
82-2738/ 2	*See* NUREG/CR-3069-Vol.2	DE83007881	MN -80	8:20723
82-2810C	NTIS, PC A02/MF A01	DE83003709	MN -38	8:21166
82-2852C	NTIS, PC A02/MF A01	DE83007409	MN -15	8:20317
82-2900C	NTIS, PC A02/MF A01; 1	DE83006808	MN -28	8:21477
82-2918	NTIS, PC A03/MF A01; 1	DE83008309	MN -37	8:21630
82-2937C	NTIS, PC A02/MF A01; 1	DE83005009	MN -32	8:21631
82-2949	NTIS, PC A03/MF A01; 1	DE83007579	MN -88	8:19613
82-2986C	NTIS, PC A02/MF A01; 1	DE83005192	MN -37	8:21167
82-3002C	NTIS, PC A03/MF A01	DE83007367	MN -4	8:21273
82-7056	NTIS, PC A11/MF A01; 1	DE83007377	MN -80	8:20348
82-7109	NTIS, PC A03/MF A01; 1	DE83008308	MN -62	8:20133
82-7133	NTIS MF A01; 2	DE83007578	MN -63	8:20020
82-7152	NTIS, PC A06/MF A01; 1	DE83007581	MN -63a	8:20047
82-8035	NTIS, PC A03/MF A01	DE83007050	MN -90e	8:19642
83-0155C	NTIS, PC A02/MF A01	DE83006292	MN -63b	8:20048
83-0269C	NTIS, PC A05/MF A01; 1	DE83006206	MN -32	8:22877
83-0422C	NTIS, PC A02/MF A01	DE83007603	MN -66c	8:20184
83-1060C	NTIS, PC A02/MF A01; 1	DE83007031	MN -62e	8:20134
83-1098C	NTIS, PC A03/MF A01	DE83007032	MN -25	8:21168
83-6000	NTIS, PC A02/MF A01; 1	DE83007239	MN -38	8:21447
83-7013C	NTIS, PC A03/MF A01; 1	DE83007839	MN -94cc	8:20752
83-8208	NTIS, PC A04/MF A01; 1	DE83008258	MN -96	8:21302
SBI-R-				
121	NTIS (US Sales Only), PC A03/MF A01; 1	DE82901185	MN -95d	8:20937
SERI/CP-				
230-1797	NTIS, PC A07/MF A01; 1	DE83005106	MN -61a	8:19937
231-1873	NTIS, PC A08/MF A01; 1	DE83005811	MN -61	8:19919
SERI/PR-				
9038-1-T1	NTIS, PC A09/MF A01; 1	DE83007385	MN -61a	8:20021
SERI/STR-				
231-1744	NTIS MF A01; 2	DE83008130	MN -61a	8:20022
SERI/TP-				
211-1851	NTIS, PC A02/MF A01	DE83005712	MN -60	8:20238
232-1733	NTIS, PC A02/MF A01	DE83007317	MN -61a	8:20023
234-1785	NTIS, PC A02; 3	DE83005128	ND -62b	8:20102
252-1775	NTIS, PC A02; 3	DE83005130	MN -62d	8:20068
252-1853	NTIS, PC A02/MF A01; 1	DE83007311	MN -62	8:20078
252-1869	NTIS MF A01; 2	DE83005127	MN -59b	8:20103
253-1830	NTIS, PC A02; 3	DE83005298	ND -62	8:20104
253-1831	NTIS, PC A02; 3	DE83005301	ND -2	8:20105
253-1839	NTIS, PC A02; 3	DE83005129	ND -62	8:20135
253-1870	NTIS, PC A02; 3	DE83006030	ND -59b	8:20136
253-1871	NTIS MF A01; 2	DE83007214	MN -62	8:20106
253-1893	NTIS, PC A02/MF A01; 1	DE83007312	MN -62b	8:20137
254-1732	NTIS, PC A02; 3	DE83005110	ND -59c	8:20107
254-1807	NTIS MF A01; 2	DE83005299	MN -59c	8:20938
SERI/TR-				
215-1781	NTIS, PC A03/MF A01; 1	DE83008132	MN -59	8:19970
251-1573	NTIS, PC A04/ MF A01; 1	DE83008296	MN -62e	8:20069
253-1833	NTIS, PC A05/MF A01; 1	DE83008133	STD -62	8:20138
635-1280	NTIS, PC A03/MF A01	DE83008162	MN -60	8:20239
8104-3-T4	NTIS, PC A04/MF A01; 1	DE83007275	MN -63b	8:20024
SFB-				
80/ E/ 214	Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe (Germany, F.R.)			8:21814
80/ T/ 211	NTIS (US Sales Only), PC A04/MF A01	DE83750303	MN -38	8:22233
SLAC-				
245	NTIS, PC A99/MF A01; 1	DE82012505	MN -34D	8:22301
SLAC-PUB-				
2954	NTIS, PC A02/MF A01; 1	DE83007016	MN -28	8:21478
2966	NTIS, PC A02/MF A01	DE83007007	MN -34D	8:22320
2981	NTIS, PC A02/MF A01; 1	DE83007005	MN -34	8:22270
2982	NTIS, PC A02/MF A01; 1	DE83007004	MN -34D	8:22271
2988	NTIS, PC A02/MF A01; 1	DE83007011	MN -34D	8:22272
2989	NTIS, PC A02/MF A01; 1	DE83007063	MN -34D	8:22273
2990	NTIS, PC A02/MF A01	DE83007010	MN -32	8:21606
2991	NTIS, PC A02/MF A01; 1	DE83007009	MN -32	8:21607
2994	NTIS, PC A02/MF A01	DE83007008	MN -32	8:21608
2997	NTIS, PC A02/MF A01	DE83007014	MN -34C	8:22162
3001	NTIS, PC A02/MF A01; 1	DE83007013	MN -34D	8:22274
3003	NTIS, PC A02/MF A01	DE83007061	MN -34D	8:22302
3004	NTIS, PC A02/MF A01	DE83007015	MN -28	8:21479
3005	NTIS, PC A02/MF A01; 1	DE83007012	MN -34D	8:22275
3006	NTIS, PC A02/MF A01; 1	DE83007018	MN -34D	8:22321
3008	NTIS, PC A02/MF A01; 1	DE83007017	MN -34D	8:21609
3015	NTIS, PC A03/MF A01; 1	DE83007062	MN -34D	8:22303
3017	NTIS, PC A02/MF A01; 1	DE83007025	MN -34D	8:22276
3022	NTIS, PC A02/MF A01; 1	DE83007060	MN -28	8:21560
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1979:22-PT-1	NTIS, PC A02/MF A01			8:21777
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STI/PUB-				
622	UNIPUB, Box 433, Murray Hill Station, New York, NY 10016		ND -70A	8:19869
625	UNIPUB, P.O. Box 433, Murray Hill Station, New York, NY 10016		ND -48	8:21919
STU-				
79-6394	*See* PB-82-213778			8:20993
T-				
15/ 80	NTIS, PC A02/MF A01			8:21087
TE-				
4296-133-82	*See* PB-82-227661			8:20918
TES/TR-				
4599-1	Teledyne Engineering Services, 303 Bear Hill Road, Waltham, MA 02154		MN -78	8:20383
4599-2	Teledyne Engineering Services, 303 Bear Hill Rd., Waltham, MA 02154		MN -78	8:20384
TR-EE-				
82-26	NTIS, PC A04/MF A01; 1	DE83006437	MN -60	8:20240
TRITA-EPP-				
81-05	NTIS, PC A02/MF A01			8:22629
81-08	NTIS, PC A03/MF A01			8:22630
TTC-				
0295	*See* PNL-4118	DE83008163	MN -46	8:21350
TVA-				
3900545	NTIS, PC A04/MF A01; 1		MN -98E	8:20282
3900546	NTIS, PC A08/MF A01; 1	DE83900546	MN -98E	8:20283
3901199	NTIS, PC A03/MF A01	DE83901199	MN -98F	8:19719
3901680	NTIS, PC A03/MF A01	DE83901680	MN -11	8:21932
TVA/OECD/FPM-				
83/ 27	NTIS, PC A03/MF A01; 1	DE83901236	MN -11	8:21883
TVA/ONR/LFR-				
83/ 4	NTIS, PC A03/MF A01	DE83901676	MN -11	8:21933
83/ 6	NTIS, PC A03/MF A01; 1	DE83901675	MN -11	8:21934
TVA/OP/ECR-				
82/ 39(9-11)	NTIS, PC A04/MF A01	DE83900173	MN -59a	8:20108
82/ 39(12-2/ 82)	NTIS, PC A04/MF A01; 1	DE83900174	MN -59a	8:20109
TVA/PUB-				
83/ 17	NTIS, PC A05/MF A01	DE83900714	MN -59c	8:20110
83/ 25	NTIS, PC A03/MF A01	DE83901164	MN -13	8:20960
83/ 28	NTIS, PC A08/MF A01	DE83901674	MN -11	8:21855
UAG-				
80	*See* AD-A-115505/0			8:22069
81	*See* AD-A-115527/4			8:22070
UCB/RP-				
82/ D1009	NTIS, PC A05/MF A01; 1	DE83004101	MN -90g	8:21088
UCID-				
18574-82-3	NTIS, PC A04/MF A01	DE83006274	MN -13	8:22564
18987-83	NTIS, PC A02/MF A01	DE83008295	MN -34C	8:22347
19115-Rev.1	NTIS, PC A02/MF A01	DE83008427	MN -97b	8:20729
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IB	International Bank for Reconstruction and Development
ID	Indonesia
IE	Ireland
IG	Inter-Governmental Maritime Consultative Organization
II	International Commission on Radiation Units and Measurements
IL	Israel

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UF	United Nations Children's Fund
UG	Uganda
UI	United Nations Industrial Development Organization
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UY	Uruguay
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VD	Democratic Republic of Viet-Nam
VE	Venezuela
VS	Republic of Viet-Nam
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WS	Western Samoa
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XC	European Organization for Nuclear Research (CERN)
XE	Commission of the European Communities (CEC)
XF	Food and Agriculture Organization of the United Nations (FAO)
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XM	Council for Mutual Economic Assistance (CMEA)
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XO	Organization of African Unity (OAU)
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XS	International Organization for Standardization (ISO)
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